Procedure to Participate in Tender

Tender Enquiry No- TPCODL/ P&S/ 167/ 2020-21

Tender Enquiry No	Work Description	EMD (Rs. Lakhs)	Tender Participation Fee (Rs.)	Last Date and Time for payment of Tender Participation Fee
TPCODL/ P&S/ 167/ 2020-21 (Part-A/Lot-1)	Two Year RC for Supply of Single Phase Smart Energy Meter	208.00	5000.00	08 JAN 2021, 15:00 Hrs
TPCODL/ P&S/ 167/ 2020-21 (Part-A/Lot-2)	Two Year RC for Supply of Three Phase Whole Current Smart Energy Meter			
TPCODL/ P&S/ 167/ 2020-21 (Part-A/Lot-3)	Two Year RC for Supply of Three Phase LTCT Smart Energy Meter			
TPCODL/ P&S/ 167/ 2020-21 (Part-A/Lot-4)	Two Year RC for Supply of Three Phase 11 KV/ 110 V HTTV Smart Energy Meter			
TPCODL/ P&S/ 167/ 2020-21 (Part-A/Lot-5)	Two Year RC for Supply of Three Phase 33 KV/ 110 V HTTV Smart Energy Meter			
TPCODL/ P&S/ 167/ 2020-21 (Part-A/Lot-6)	Two Year RC for Supply of Three Phase DT Smart Energy Meter			
TPCODL/ P&S/ 167/ 2020-21 (Part-B)	RFP for SITC of Head End System & 4G Communication for deployment of AMI System at TPCODL for SMART METERING SOLUTION			

Note :

1. **Tender fee is inclusive of GST.**

Please note that corresponding details mentioned in this document will supersede any other details mentioned anywhere else in the Tender Document.

Procedure to Participate in Tender.

Following steps to be done before “Last date and time for Payment of Tender Participation Fee” as mentioned above

1. Eligible and Interested Bidders to submit duly signed and stamped letter on Bidder's letter head indicating
    a. Tender Enquiry number
    b. Name of authorized person

c. Contact number
d. e-mail id
e. Details of submission of Tender Participation Fee
f. GST Registration No

2. Non-Refundable Tender Participation Fee, as indicated in table above, to be submitted in the form of

   Direct deposit in the following bank account and submit the receipt along with a covering letter clearly indicating the Tender Reference/ Enquiry Number –

   Beneficiary Name – TP Central Odisha Distribution Ltd.
   Bank Name – STATE BANK OF INDIA
   Branch Name – IDCO Towers, Bhubaneshwar
   Address – PO- Sahidnagar, Janapath, Bhubaneswar.
   Branch Code – 7891
   Account No – 10835304915
   IFSC Code – SBIN0007891

   E-mail with necessary attachment of 1 and 2 above to be sent to **tapas.rout@tpcentralodisha.com** with copy to sudhakar.behera@tpcentralodisha.com and pravin.jain@tpcentalodisha.com before last date and time for payment of Tender Participation Fee.

   Interested bidders to submit Tender Participation Fee and Authorization Letter before Last date and time as indicated above after which link from TPCODL E-Tender system (Ariba) will be shared for further communication and bid submission.

   Please note all future correspondence regarding the tender, bid submission, bid submission date extension, Pre-bid query etc will happen through TPCODL E-Tender system (Ariba). User manual to guide the bidders to submit the bid through E-Tender system (Ariba) is enclosed.

   All communication will be done strictly with the bidders who have done the above step to participate in the Tender.

   Also it may be strictly noted that once date of “Last date and time for Payment of Tender Participation Fee” is lapsed no Bidder will be sent link from TPCODL E-Tender System (Ariba). Without this link vendor will not be able to participate in the tender. Any last moment request to participate in tender will not be entertained.

   Also all future corrigendum’s to the said tender will be informed on Tender section on website https://www.tpcentralodisha.com.

OPEN TENDER NOTIFICATION FOR

SUPPLY OF DIFFERENT TYPES OF SMART ENERGY METERS AND

SUPPLY, INSTALLATION, TESTING, COMMISSIONING, INTEGRATION, COMMUNICATION, OPERATION & MAINTENANCE OF HEAD END SYSTEM

UNDER

SMART METERING SOLUTION

Tender Enquiry No.: TPCODL/ P&S/ 167/ 20-21

Due Date for Bid Submission: 31.01.2021 [15:00 Hrs.]

The TP Central Odisha Distribution Limited
2nd Floor,IDCO Towers, Janpath, Bhubaneswar-751022

CONTENTS OF THE ENQUIRY

1.0 Event Information

1.1 Scope of work

PART-A - **Supply of Different Types of SMART ENERGY METERS Under Smart Metering Solution.**

PART-B - **Supply, Installation, Testing, Commissioning, Integration, Communication, Operation & Maintenance of HEAD END SYSTEM Under Smart Metering Solution.**

Open Tenders are invited through e-tender bidding process from interested eligible bidders for entering into a RATE CONTRACT for Part-A items valid for a period of TWO (2) Years and a FIRM ORDER for PART-B work as per the schedule given below:

PART-A Schedule				
Line Item No.	**Tender description**	**Tender Enquiry No.**	**UoM**	**Quantity**
1	TWO Year RC for Supply of Single Phase Smart Energy Meter	TPCODL/ P&S/ 167/ 2020-21 (Part- A/Lot-1)	EA	70,000
2	TWO Year RC for Supply of Three Phase Whole Current Smart Energy Meter	TPCODL/ P&S/ 167/ 2020-21 (Part- A/Lot-2)	EA	1,70,000
3	TWO Year RC for Supply of Three Phase LTCT Smart Energy Meter	TPCODL/ P&S/ 167/ 2020-21 (Part- A/Lot-3)	EA	3,000
4	TWO Year RC for Supply of Three Phase 11 KV/ 110 V HTTV Smart Energy Meter	TPCODL/ P&S/ 167/ 2020-21 (Part- A/Lot-4)	EA	550
5	TWO Year RC for Supply of Three Phase 33 KV/ 110 V HTTV Smart Energy Meter	TPCODL/ P&S/ 167/ 2020-21 (Part- A/Lot-5)	EA	50
6	TWO Year RC for Supply of Three Phase DT Smart Energy Meter	TPCODL/ P&S/ 167/ 2020-21 (Part- A/Lot-6)	EA	12,000
PART-B Schedule				
Line Item No.	**Tender description**	**Tender Enquiry No.**	**UoM**	**Quantity**
A	**Supply (of Software solution)**			
1	Web based software solution (Shall be hosted on Cloud) inclusive of Head End System (database included), web application, data archiving , system integration with MDMS, End to end Communication from meter till TPCODL Control Center and any other item required to deploy the application for 250000 end Points	TPCODL/ P&S/ 167/ 2020-21 (Part- B)	EA	1
B	**Service**			
1	Facility Management services (inclusive of communication network after go live. Till go live, bidder has to bear the cost of the hosting system on cloud)	TPCODL/ P&S/ 167/ 2020-21 (Part- B)	Year	7

2	Cloud Hosting Charges	TPCODL/ P&S/ 167/ 2020-21 (Part- B)	Year	7
3	SIM card rental	TPCODL/ P&S/ 167/ 2020-21 (Part- B)	Card/ Month	2.5 Lac (on need basis)

1.2 Availability of Tender Documents

Please Refer "Procedure to participate in the e-Tender".

1.3 Calendar of Events

(a)	Date of sale/ availability of tender documents from TPCODL Website	From 31.12.2020 onwards
(b)	Date by which Interested and Eligible Bidder to pay Tender Fee and confirm participation as mentioned in "Procedure to Participate in Tender"	08.01.2021 , 15:00 Hrs
(c)	Last Date and time of receipt of pre-bid queries, if any	13.01.2021 up to 15:00 Hours
(d)	Date & Time of Pre-Bid Meeting (If any)	Will be informed later
(e)	Last Date of Posting Consolidated replies to all the pre-bid queries as received	25.01.2021
(f)	Last date and time of receipt of Bids	31.01.2021 up to 15:00 Hours
(g)	Date & Time of opening technical bids & EMD (Envelope-1 & 2)	Participating Bidders will get mail intimation from TPCODL E-Tender system (Ariba) when their Technical Bids are opened. Refer Section 4.2 for details
(h)	Date & Time of opening of Price of qualified bids	Bidders will get mail intimation from TPCODL E-Tender system (Ariba) when their Price Bids are opened (Refer Section 4.5)

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 TPCODL, Bhubaneswar office the last date of submission of bids and date of opening of bids will be the following working day at appointed time.

1.4 Mandatory documents required along with the Bid

1.4.1 EMD of requisite value and validity.
1.4.2 Tender Fee of requisite amount.
1.4.3 Requisite Documents for compliance to Qualification Criteria mentioned in Clause 1.7.
1.4.4 Drawing, Type Test details along with a sample of each item as specified at Annexure I (as applicable)
1.4.5 Duly signed and stamped 'Schedule of Deviations' as per Annexure III on bidder's letter head.
1.4.6 Duly signed and stamped 'Schedule of Commercial Specifications' as per Annexure IV on bidder's letter head.
1.4.7 Proper authorization letter/ Power of Attorney to sign the tender on the behalf of bidder.
1.4.8 Copy of PAN, GST, PF and ESI Registration (In case any of these documents is not available with the bidder, same to be explicitly mentioned in the 'Schedule of Deviations')

Please note that in absence of any of the above documents, the bid submitted by a bidder shall be liable for rejection.

1.5 Deviation from Tender

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 III - Schedule of Deviations' and same shall be submitted as a part of the Technical Bid.

1.6 Right of Acceptance/ Rejection

Bids are liable for rejection in absence of following documents: -

1.6.1 EMD of requisite value and validity
1.6.2 Tender fee of requisite value
1.6.3 Price Bid as per the Price Schedule mentioned in Annexure-I
1.6.4 Necessary documents against compliance to Qualification Requirements mentioned at Clause 1.7 of this Tender Document.
1.6.5 Filled in Schedule of Deviations as per Annexure III
1.6.6 Filled in Schedule of Commercial Specifications as per Annexure IV
1.6.7 Receipt of Bid within the due date and time

TPCODL reserves the right to accept/reject any or all the bids without assigning any reason thereof.

1.7 Bidder Qualification Criteria / Eligibility Criteria And Notes To It

Bidder should be a Smart Meter Manufacturer /OEM meeting all the Eligibility Criteria as enumerated in the General Requirements, Technical Requirements and Financial Requirements below.

In case the Bidder cannot meet all the Eligibility Criteria by himself, the Bidder can form a Consortium with another Smart Meter manufacturer, System Integrator and / or OEM of the Head End System (HES). The Consortium partners together shall meet the Eligibility Criteria except where individual Consortium partners need to meet the Eligibility Criteria when specifically mentioned. In case of a bid by Consortium, the Smart Meter Manufacturer /OEM shall always be the Lead Bidder of the Consortium.

1. General Requirements:

Sr. No.	Requirement	Indicative Documents to be submitted with Bid
1	The bidder should have presence in India for last 10 Years and must have registered office in India.	Copy of Certificate of Incorporation prior to 01.04.2010 to be enclosed in this regard.
2	The bidder should be an OEM of SMART Energy Meter having their own manufacturing unit established within INDIA. TPCODL reserve the right to confirm the manufacturing facility by visiting bidder's plant / works.	The Bidder shall submit valid BIS license against the meters they offer. The license should bear the name/ trademark of the manufacturing company. If validity of the BIS certificate has expired and the firm has applied for renewal, copy of the letter of correspondence with previous approval must be attached in the bid document. Renewal copy of the same shall be produced to the authority as soon as obtained by the bidder.

3	The bidder must integrate their HES with major communication network service providers like Reliance Jio /Airtel/ Vodafone Idea on /LTE 4G	The bidder must submit self undertaking to integrate their HES with major communication network service providers.
4	The bidder must integrate their HES with TPCODL MDM system.	The bidder must submit self undertaking to integrate their HES with TPCODL MDM system.

2. Technical Requirements:

Sr. No.	Requirement	Indicative Documents to be submitted with Bid
1	The bidder should have supplied at least 10,00,000 nos. of Static energy meters and 50,000 SMART Energy Meters during the last 5 Financial Years.	Copy of Purchase order / Customer Order/ appreciation letter/ supply completion certificate to be submitted in this regard.
2	The bidder should have experience of HES implementation for Advance Metering Infrastructure (AMI) on Cellular technology with at least Three (3) utilities in India during last Three (3) years.	PO copies/ completion certificate/ confirmation e-mail shall be submitted in this regard.
3	The bidder should have experience of handling data of more than 3 lakhs meters on cellular technology.	PO copies/ completion certificate/ confirmation e-mail shall be submitted in this regard.
4	Bidder should have experience of integration of their HES with Meter Data Management System (MDMS), billing applications.	Letter from utilities / customers be provided in support of this claim.
5	Bidder shall submit satisfactory performance certificates for the past 1-year experience from 3 reputed companies.	The work against these issued certificates should have been completed in last 7 years from the original date of bid submission. In case, the bidder has a previous association with Tata Power or its associated group of companies for similar products and services, the performance feedback for that bidder by Tata Power or its associated group of companies User Group shall only be considered irrespective of performance certificates issued by any third organization.
6	The bidder should have their own laboratory having valid NABL accreditation certificate for conducting in-house testing of all Acceptance Tests as per TPCODL technical specification.	Bidder must submit self-undertaking along with NABL accreditation certificate and detail list of testing facility and testing equipment.
7	The bidders must have CMMI Level 3 certified.	Valid certificate in this regard shall be furnished by the bidder.

3. Financial Requirements

Sr. No.	Requirement	Indicative Documents to be submitted with Bid
1	The Bidder and Consortium partner/s, if any,	Copies of POs / LOIs and Work Completion

	shall have each executed AMI Projects with minimum One (1) project costing not less than the amount equal to 50 Crores (Rupees Fifty Crores) during past five (05) years as on original date of bid submission.	Certificate issued by the client.
2	The bidder should have average annual turnover of Rs.300 Crore in last three years (FY 17-18, FY 18-19 and FY 19-20).	Copy of Audited balance sheet, profit and loss account and auditors report from the statutory auditors of the company required to be submitted. In cases, where audited results for the last preceding financial year are not available, certification of financial statements from a practicing Chartered Accountant/ Company Secretary shall also be considered acceptable.
3	Liquid Assets and / or evidence of access to availability of credit facility of the Bidder, in any case should not be less than Rs. 50 Crore (Rupees Fifty Crore only)	Copy of original solvency certificate from bank should be submitted by the bidder.
4	The Net Worth of the Bidder as on the last day of the preceding financial year is at least equal to or more than the paid-up share capital	

Notes for Financial Requirements:

a) Both the members of consortium shall collectively meet the complete requirements mentioned at clause no. 2 & 3 of Financial Requirement.
Further, the partners of Consortium shall meet the following requirement also:
i) The Lead Bidder shall meet not less than 70% of the Financial Requirements criteria given at Sr. No. 2. and 3, above.
ii) The Consortium partners other than Lead Bidder each shall meet not less than 30% of the minimum Financial Requirement criteria given at Sr. No. 2. and 3 above.

b) Net Worth means the sum total of the paid up share capital and free reserves. Free reserves means all reserves credited out of the profits and share premium account but do not include reserves credited out of the revaluation of assets, write back of depreciation provisions and amalgamation. Further, any debit balance of profit and loss account and miscellaneous expenses to the extent not adjusted or written off, if any, shall be reduced from Reserves & Surplus.

c) Other income shall not be considered for arriving at annual turnover.

Notes to Bidder's Eligibility Criteria:

a) There shall not be more than Two (2) Consortium partners along with the main Bidder. The Consortium partner should be exclusive to the Bidder for the purpose of this Tender. Change in Consortium partner shall not be allowed till execution and completion of the project in entirety. For avoidance of doubt, the Bidder and/ or Consortium partner shall be allowed to participate in only one Consortium. Multiple Bids involving a common entity as partner shall be rejected summarily.

b) Relevant documentary evidence from the Bidder (and Consortium partner, if any) shall be submitted along with the pre-qualification document to establish the required credentials as stated above.

c) In case of Consortium, the lead partner who desires to bid against this specifications may submit the offer jointly with another Meter Manufacturer/ OEM, System Integrator or Head End System (HES) OEM by entering into a legally valid agreement subject to fulfilment of following requirements:
   i. In case of a successful bid, the Contract Agreement shall be signed so as to be legally binding on all partners of the Consortium.
   ii. All partners of the consortium shall be jointly and severally liable for execution of the contract in accordance with the Contract terms.

d) The lead bidder shall be authorized to be in charge and this authorization shall be evidenced by submitting a duly registered/ notarized power of attorney signed jointly by legally authorized signatories of all partners. A copy of the agreement entered into by the consortium partners shall be submitted with the bid.

e) The bid document should have been purchased and submitted by the lead partner only.

f) Owner's interpretation of the clauses & Owner's decision shall be final.

1.8 Marketing Integrity

We have a fair and competitive marketplace. The rules for bidders are outlined in the General Condition of Contracts. Bidders must agree to these rules prior to participating. In addition to other remedies available, TPCODL reserves 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 General Condition of Contracts. A bidder who violates the market place rules or engages in behavior that disrupts the fair execution of the marketplace, may result in restriction of a bidder from further participation in the marketplace for a 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 terms as published in TENDER/NIT

1.9 Supplier Confidentiality

All information contained in this tender is confidential and shall not be disclosed, published or advertised in any manner without written authorization from TPCODL. This includes all bidding information submitted to TPCODL. All tender documents remain the property of TPCODL and all suppliers are required to return these documents to TPCODL upon request. Suppliers who do not honor these confidentiality provisions will be excluded from participating in future bidding events.

2.0 Evaluation Criteria

- The bids will be evaluated technically on the compliance to tender terms and conditions.
- The bids will be evaluated commercially on **overall lowest cost(on total cost of ownership) Basis** as calculated in Schedule of Items *[Annexure I]* .TPCODL reserves the right to split the order line item wise and / or quantity wise, among more than one Bidder. Hence all bidders are advised to quote their most competitive rates.
- Bidder has to mandatorily quote as per schedule of item [Annexure-I]. Failing to do so TPCODL may reject the bid.

NOTE: In case of a new bidder not registered, factory inspection and evaluation shall be carried out to ascertain bidder's manufacturing capability and quality procedures. However, TPCODL reserves the right to carry out factory inspection and evaluation for any bidder prior to technical qualification. In case a bidder is found as Disqualified in the factory evaluation, their bid shall not be evaluated any further and shall be summarily rejected. The decision of TPCODL shall be final and binding on the bidder in this regard.

2.1 Price Variation Clause: The prices shall remain **FIRM** during the entire contract period.

3.0 Submission of Bid Documents

3.1 Bid Submission

Bidders are requested to submit their offer in line with this Tender document through e-tendering process.

Please note all future correspondence regarding the tender, bid submission, bid submission date extension, Pre-bid query etc will happen through TPCODL E-Tender system (Ariba).

All communication will be done strictly with the bidder who have done the above step to participate in the Tender.

Bids shall be submitted in 3 (Three) parts:

FIRST PART: "**EMD**" as applicable for the tendered items shall be submitted. The EMD shall be valid for 210 days from the due date of bid submission in the form of Bank Guarantee / Bank Draft / Bankers Pay Order (issued from a Scheduled Bank) favoring 'TP Central Odisha Distribution Limited" payable at Bhubaneswar. The EMD (BG) has to be strictly in the format as mentioned in General Condition of Contract, failing which it shall not be accepted and the bid as submitted shall be liable for rejection. A separate non-refundable tender fee of stipulated amount also needs to be transferred online through NEFT/ RTGS in case the tender document is downloaded from our website.

TPCODL Bank Details for transferring Tender Fee and EMD is as below:

Account Name: TP Central Odisha Distribution Limited
Bank Name: SBI, IDCO Towers, Bhubaneswar
Bank Account No. : 10835304915
IFSC Code : SBIN0007891

EMD is preferred in form of Bank Guarantee and to be delivered at the following address. However in view of present situation if Bidder is finding it difficult to make and submit BG for EMD amount, they can do online transfer of EMD amount in the above mentioned Account and submit proof of the same as part of Bid Submission.

Please note that in such case, Tender Fee and EMD should be strictly 2 separate transactions.

Please note as return of EMD from Bank Account is non standard practice the same may take more time than return of EMD BG.

EMD Original Hard Copy shall be delivered at the following address in Envelope clearly indicating Tender Reference/ Enquiry Number, Name of Tender and Bidder Name

Chief (Procurement & Stores)
TP CENTRAL ODISHA DISTRIBUTION LIMITED
2ND FLOOR, IDCO TOWERS, JANAPATH, BHUBANESWAR- 751022

SECOND PART: "TECHNICAL BID" shall contain the following documents:

a) Documentary evidence in support of qualifying criteria
b) Technical literature/GTP/Type test report etc. *(if applicable)*
c) Qualified manpower (if available)
d) Testing facilities *(if applicable)*
e) No Deviation Certificate as per the Annexure III – Schedule of Deviations

f) Acceptance to Commercial Terms and Conditions viz Delivery schedule/period, payment terms etc. as per the Annexure IV – Schedule of Commercial Specifications.

g) Quality Assurance Plan/Inspection Test Plan for supply items *(if applicable)*

h) Project Implementation Plan including Level 2 Schedule for the project

i) Unpriced mentioning "**Quoted/Not Quoted"** against all line items (Prices should not be mentioned)

The technical bid shall be properly indexed and is to be submitted through TPCODL E-tender System (Ariba) only. Hard Copy of Technical Bids need not be submitted.

The Bid prepared by the Bidder, and all correspondence and documents relating to the Bid exchanged by the Bidder and the TPCODL, 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.

THIRD PART: "PRICE BID" shall contain only the price details and strictly in format as mentioned in **Annexure I** with explicit break up of basic prices, Taxes & duties, Freight etc. In case any discrepancy is observed between the item description stated in Schedule of Items mentioned in the tender and the price bid submitted by the bidder, the item description as mentioned in the tender document (to the extent modified through Corrigendum issued if any) shall prevail. Price Bid is to be submitted in soft copy through TPCODL E-Tendering system (Ariba) only. **Hard copy of Price Bid not be submitted**.

SIGNING OF BID DOCUMENTS:

The bid must contain the name, residence and place of business of the person or persons making the bid and must be signed and sealed by the Bidder with his usual signature. The names of all persons signing should also be typed or printed below the signature.

The Bid being submitted must be signed by a person holding a Power of Attorney authorizing him to do so, certified copies of which shall be enclosed.

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.

3.2 Contact Information

Please note all correspondence regarding the tender, bid submission, bid submission date extension, Pre-bid query etc will happen through TPCODL E-Tender system (Ariba).

All communication will be done strictly with the bidder who have done the above step to participate in the Tender.

Communication Details:

Package Owner

Name: Mr. Tapas Ranjan Rout
Designation: Asst. Manager – Procurement (Commercial Services)
Contact No: 9439783444
E-Mail ID: tapas.rout@tpcentralodisha.com

Escalation Matrix

Name: Mr. Sudhakar Behera
Designation: General Manager – Procurement (Commercial Services)
Contact No: 9437282663
E-Mail ID: sudhakar.behera@tpcentralodisha.com

Name: Mr. Pravin Ku Jain
Designation: Chief (Procurement & Stores)
E-Mail ID: pravin.jain@tpcentralodisha.com

Bidders are strictly advised to communicate with Package Owner through TPCODL E-tender System (Ariba) only. They need to pay Tender Participation Fee and receive the Ariba log-in. Above escalation details are for reference purpose only.

3.3 Bid Prices

Bidders shall quote for the entire Scope of Supply / work with a break up of prices for individual items and Taxes & duties. The bidder shall complete the appropriate Price Schedules included herein, stating the Unit Price for each item & total price with taxes, duties & freight up to destination at various sites of TPCODL. The all-inclusive prices offered shall be inclusive of all costs as well as Duties, Taxes and Levies paid or payable during the execution of the supply work, breakup of price constituents.

The quantity break up shown else-where other than Price Schedule is tentative. The bidder shall ascertain himself regarding material required for completeness of the entire work. Any items not indicated in the price schedule but which are required to complete the job as per the Technical Specifications / Scope of Work mentioned in the tender, shall be deemed to be included in prices quoted.

3.4 Bid Currencies

Prices shall be quoted in Indian Rupees Only.

3.5 Period of Validity of Bids

Bids shall remain valid for 180 days from the due date of submission of the bid.

Notwithstanding clause above, the TPCODL may solicit the Bidder's consent to an extension of the Period of Bid Validity. The request and responses thereto shall be made in writing.

3.6 Alternative Bids

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.

3.7 Modifications and Withdrawal of Bids

The bidder is not allowed to modify or withdraw its bid after the Bid's submission unless asked by TPCODL. The EMD as submitted along with the bid shall be liable for forfeiture in such event.

3.8 Earnest Money Deposit (EMD)

The bidder shall furnish, as part of its bid, an EMD amounting as specified in the tender. **Bidder shall participate for supply of / all items as mentioned in Schedule of Items (ANNEXURE-I).** The EMD is required to protect the TPCODL against the risk of bidder's conduct which would warrant forfeiture. The EMD shall be denominate in any of the following form:

- Banker's Cheque/ Demand Draft/ Pay order drawn in favor of " TP Central Odisha Distribution Limited", payable at Bhubaneswar.
- Online transfer of requisite amount through NEFT/ RTGS.
- Bank Guarantee valid for 210 days after due date of submission.

The EMD shall 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

3.9 Type Tests (if applicable)

The type tests specified in TPCODL specifications should have been carried out in certified Test Laboratories during the period not exceeding 5 years from the date of opening of technical bids and test reports are to be submitted along with the bids. If type tests carried out are not within the five years prior to the date of bidding, the bidder will arrange to carry out type tests specified, at his cost. The decision to accept/ reject such bids rests with TPCODL.

4.0 Bid Opening & Evaluation process

4.1 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 TPCODL's processing of Bids or award decisions may result in the rejection of the Bidder's Bid.

4.2 Technical Bid Opening

The bids shall be opened internally by TPCODL as per our standard process. Participating Bidders will get mail intimation from TPCODL E-Tender system (Ariba) when their Technical Bids are opened.

First the envelope marked "EMD" will be opened. Bids without EMD/ cost of tender (if applicable) of required amount/ validity in prescribed format, shall be rejected.

4.3 Preliminary Examination of Bids/ Responsiveness

TPCODL 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. TPCODL may ask for submission of original documents in order to verify the documents submitted in support of qualification criteria.

Prior to the detailed evaluation, TPCODL 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.

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

4.4 Techno Commercial Clarifications

Bidders need to ensure that the bids submitted by them are complete in all respects. To assist in the examination, evaluation and comparison of Bids, TPCODL may, at its discretion, ask the Bidder for a clarification on its Bid with respect to the TPCODL specifications and attempt will be made to bring all bids on a common footing. 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 owing to any clarifications sought by TPCODL.

4.5 Price Bid Opening

Price Bid of only Technically and / or safety qualified Bidders shall be considered and open internally by TPCODL. Bidders will get mail intimation from TPCODL E-Tender system (Ariba) when their Price Bids are opened.

The EMD of the bidder withdrawing or substantially altering his offer at any stage after the technical bid opening will be forfeited at the sole discretion of TPCODL without any further correspondence in this regard.

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.

4.7 Reverse Auctions and Price Matching Option

TPCODL reserves the right to conduct the reverse auction AND / OR Manual Negotiations (instead of public opening of price bids) for the products/ services being asked for in the tender. Only Technical Qualified Bids will be allowed to participate in e-auction. Date and time of e-auction will be intimated through E-Tender system to Authorized Person of Interested Bidder. The terms and conditions for such reverse auction events shall be as per the Acceptance Form attached as Annexure VI of this document. The bidders along with the tender document shall mandatorily submit a duly signed copy of the Acceptance Form attached as **Annexure VI** as a token of acceptance for the same.

For case where more than one bidders have to be awarded (including Rate Contract / Outline Agreement) Price Matching Option will be exercised. Volume of job allocated to original competitive bidder will be more than bidder who is chosen through Price Matching Option. TPCODL decision regarding work sharing shall be final and no explanation OR clarification shall be given regarding the same.

5.0 Award Decision

TPCODL will award the contract to the successful bidder whose bid has been determined to be the lowest-evaluated responsive bid as per the Evaluation Criterion mentioned at Clause 2.0. The Cost for the said calculation shall be taken as the all-inclusive cost quoted by bidder in **Annexure I (Schedule of Items)** subject to any corrections required in line with **Clause 4.3** above. The decision to place rate contract / purchase order / LOI solely depends on TPCODL on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that TPCODL may deem relevant.

TPCODL reserves all the rights to award the contract to one or more bidders so as to meet the delivery requirement or nullify the award decision without assigning any reason thereof.

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

5.1 Rate Contract / Outline Agreement

Rate Contract / Outline Agreement does not guarantee any assured business volume in Rupees or Quantity. Quantities are only indicative and specified for the purpose of readiness as per the request from Purchaser. Supplies shall be only against Firm Purchase Orders placed as per the agreed terms and conditions of Rate Contract / Outline Agreement. Purchaser shall be entitled at its discretion to place firm order for such supplies on "As and When Required Basis" without minimum take-off guarantee.

Rate Contract / Outline Agreement will have list of Items with Unit Rate and applicable Taxes and Duties. There will be a cap on value for which order which can be placed against the Rate Contract / Outline Agreement. Actual quantity ordered for each line item may differ significantly from the tentative quantity indicated in the Tender Document. One / few / all items of Rate Contract / Outline Agreement can be ordered till the Cap Value is reached

6.0 Order of Preference/Contradiction:

In case of contradiction in any part of various documents in tender, following shall prevail in order of preference:

1. Schedule of Items (Annexure I)
2. Post Award Contract Administration (Clause 7.0)
3. Submission of Bid Documents (Clause 3.0)
4. Scope of Work and SLA (if any)
5. Technical Specifications (Annexure II)
6. Inspection Test Plan (if any)
7. Acceptance Form for Participation in Reverse Auction (Annexure VI)
8. General Conditions of Contract (Annexure VII)

7.0 Post Award Contract Administration

7.1 Special Conditions of Contract

- After finalization of tender,
  a) **For supply of energy meters** - Rate Contract shall be issued on successful bidder with a validity period of **TWO consecutive Years**. **Prices shall remain firm till validity of issued rate contract**. Within the validity of rate contract and as per requirement of material, release order shall be issued time to time.
  b) **For providing Solution for HES** - Firm Order shall be issued on successful bidder. Prices shall remain firm till validity of contract.
- Business Associate (BA) shall submit applicable Performance Bank Guarantee as per GCC within 15 days of issuance of rate contract.
  a) **For supply of energy meters** - PBG applicable shall 5% of Rate Contract Value. PBG submitted, shall be released after completion of applicable guarantee period plus three month.
  b) **For providing Solution for HES -** PBG applicable shall be 10% of Total PO value. PBG submitted, shall be released after completion of applicable guarantee period plus three months of claim period.
- Guarantee applicable shall be as per technical specifications.
- **Within 30 days of Rate Contract issuance by TPCODL, it is the responsibility of BA to get manufacturing clearance and CAT-A issued from TPCODL.** In case BA does not get necessary approvals for issuance of CAT-A within mentioned / mutually agreed timelines, then TPCODL

reserve the right to cancel issued rate contract / release order and also reserve the right to forfeit EMD / PBG.

- Delivery period shall be
  a) **For supply of energy meters** - 60 days from date of receipt of release order / CAT-A issuance, whichever is later.
  b) **For providing Solution for HES -** Completion Schedule / Delivery period shall be as per timelines defined in Technical Specifications.
- TPCODL shall short close the issued Order / contract, in case of any quality issues.
- Any change in statutory taxes, duties and levies shall be borne by TPCODL.
- All other terms and conditions of TPCODL GCC shall be applicable.

7.2 Drawing Submission & Approval

The relevant drawings and GTPs need to be submitted as per special condition of contract mentioned in point no. 7.1.

7.3 Delivery Requirement :

The delivery of material shall be made as per following schedule of requirement adhering to delivery period as mentioned in point 7.1 special condition of contract.

For supply of energy meters

Line Item No.	Tender description	UoM	Total Quantity	Requirement in Year 1	Requirement in Year 2
1	Supply of Single Phase Smart Energy Meter	EA	70,000	21000	49000
2	Supply of Three Phase Whole Current Smart Energy Meter	EA	1,70,000	42000	128000
3	Supply of Three Phase LTCT Smart Energy Meter	EA	3,000	1000	2000
4	Supply of Three Phase 11 KV/ 110 V HTTV Smart Energy Meter	EA	550	200	350
5	Supply of Three Phase 33 KV/ 110 V HTTV Smart Energy Meter	EA	50	20	50
6	Supply of Three Phase DT Smart Energy Meter	EA	12,000	5800	6200
	TOTAL		**255600**	**70020**	**185580**

Note:-

1) The quantity may vary as per actual requirement at the time of placing final order.

2) Out of the above total quantity 20% of the meters shall be of other OEM.

For providing Solution for HES

Sl. No.	Milestone	Timeline of completion from PO date
1	Receipt of 1,000 endpoints data to HES from field on daily basis as per	**3 Months**

	reading schedule continuously for seven days. In this data, minimum one type of Single Phase meter, One type of Three Phase Whole Current Meter, One type of LT CT Meters, one type of HT CT Meter and one type of DT CT meters data should be present.	
2	Receipt of 1000 meters data in MDMS in required format. Data correctness has to be verified. This will mark the Go Live of Project and warranty period of HES shall start. Data Means all data as per OBIS code list attached with meter specification. Or as agreed by EIC at the time of acceptance.	**4 Months**
3	stabilization of system. (Stabilization means all items in scope of the tender for HES as required to be delivered.)	**12 Months**

7.4 Guarantee Period

Guarantee Period of the supplied material shall be as per technical specification attached separately with this tender.

7.5 Payment Terms

On delivery of the materials in good condition and certification of acceptance by certified official, Associate shall submit the Bills/ Invoices in original in the name of TP Central Odisha Distribution Limited to Invoice Desk.

Against Supply of Meters

60% along with 100% GST payment shall be released **within 45 days** from the date of submission of certified bills/ invoices after Successful integration testing of meters with HES at Factory, supply & receipt of meters in Store. Balance 40% amount will be retained up to the successful integration of meter with the Head End System (HES) along with data acquisition & will be released after One (1) year supply if such integration cannot be completed for reasons solely attributed to TPCODL.

Against Providing HES Solution

Payment shall be made within 45 days of bill submission duly certified by user department as per below details:

(A) Supply

1) 5% advance on approval of Project Implementation Plan, CAT-A Drawings for mobilization against:

- Acceptance of PO & Intimation by TPCODL
- Submission of CPBG as per tender condition valid till 7 years warranty plus 3 months of claim period.

2) 30% payment against:

- Receipt of 1,000 endpoints data in HES from field on daily basis as per reading schedule continuously for seven days. In this data, minimum one type of Single Phase meter, One type of Three Phase Whole Current Meter, One type of LT CT Meters, one type of HT CT Meter and one type of DT CT meters data should be present.

3) 35% payment against:

- Receipt of 1000 meters data in MDMS in required format. Data correctness has to be verified. Data Means all data as per OBIS code list attached with meter specification or as agreed by EIC at the time of acceptance.

4) 30% payment against:

- Stabilization of system. Stabilization means all items in scope of the tender for HES as required to be delivered.

(B) Service

(1) 25% of yearly value shall be paid on quarterly basis in arrears as per SLA compliance.

7.6 Climate Change

Significant quantities of waste are generated during the execution of project and an integrated approach for effective handling, storage, transportation and disposal of the same shall be adopted. This would ensure the minimization of environmental and social impact in order to combat the climate change

7.7 Ethics

TPCODL is an ethical organization and as a policy TPCODL lays emphasis on ethical practices across its entire domain. Bidder should ensure that they should abide by all the ethical norms and in no form either directly or indirectly be involved in unethical practice.
TPCODL work practices are governed by the Tata Code of Conduct which emphasizes on the following:

- We shall select our suppliers and service providers fairly and transparently.
- We seek to work with suppliers and service providers who can demonstrate that they share similar values. We expect them to adopt ethical standards comparable to our own.
- Our suppliers and service providers shall represent our company only with duly authorized written permission from our company. They are expected to abide by the Code in their interactions with, and on behalf of us, including respecting the confidentiality of information shared with them.
- We shall ensure that any gifts or hospitality received from, or given to, our suppliers or service providers comply with our company's gifts and hospitality policy.
- We respect our obligations on the use of third party intellectual property and data.

Bidder is advised to refer GCC attached for more information.

Any ethical concerns with respect to this tender can be reported to the following e-mail ID:

1) Chief (Procurement & Stores)- pravin.jain@tpcentralodisha.com.

2) Chief Ethics Counselor – rajeev.kharyal@tpcentralodisha.com

8.0 Specification and standards:

Attached separately with tender.

9.0 General Condition of Contract

Any condition not mentioned above shall be applicable as per GCC for Supply attached along with this tender.

10.0 Safety

Safety related requirements as mentioned in our safety Manual is put in the Company's website and same shall be strictly followed.

http://www.tpcentralodisha.com

All Associates shall strictly abide by the guidelines provided in the safety manual at all relevant stages during the contract period.

ANNEXURE I
Schedule for Items

Part-A	Supply of Different Types of SMART ENERGY METERS Under Smart Metering Solution						
Line Item	**Description**	**Qty**	**UoM**	**Ex. Work (in Rs.) A**	**GST (in Rs.) B**	**Unit Price with GST (in Rs.) A+B**	**Amount (in Rs.) Q x (A+B)**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Part-A/ Lot-1	Supply of Single Phase Smart Energy Meter as per Technical Specification mentioned in TN- TPCODL/ P&S/ 167 (Part-A)/ 20-21 (LOT-1) of TPCODL.	70,000	EA				
Part-A/ Lot-2	Supply of Three Phase Whole Current Smart Energy Meter as per Technical Specification mentioned in TN-TPCODL/ P&S/ 167 (Part-A)/ 20-21 (LOT-2) of TPCODL.	1,70,000	EA				
Part-A/ Lot-3	Supply of LTCT Smart Energy Meter as per Technical Specification mentioned in TN-TPCODL/ P&S/ 167 (Part-A)/ 20-21 (LOT-3) of TPCODL.	3,000	EA				
Part-A/ Lot-4	Supply of Three Phase 11KV/110V HTTV Smart Energy Meter as per Technical Specification mentioned in TN-TPCODL/ P&S/ 167 (Part-A)/ 20-21 (LOT-4) of TPCODL.	550	EA				
Part-A/ Lot-5	Supply of Three Phase 33KV/110V HTTV Smart Energy Meter as per Technical Specification mentioned in TN-TPCODL/ P&S/ 167 (Part-A)/ 20-21 (LOT-5) of TPCODL.	50	EA				
Part-A/ Lot-6	Supply of Three Phase DT Smart Energy Meter as per Technical Specification mentioned in TN- TPCODL/ P&S/ 167 (Part-A)/ 20-21 (LOT-6) of TPCODL.	12,000	EA				
TOTAL (Part-A)							
Total (Part-A) Rupees in words		Rs. (----------) Only.					

Part-B	Supply, Installation, Testing, Commissioning, Integration, Communication, Operation & Maintenance of HEAD END SYSTEM Under Smart Metering Solution						
Line Item	**Description**	**Qty**	**UoM**	**Ex. Work (in Rs.) A**	**GST (in Rs.) B**	**Unit Price with GST (in Rs.) A+B**	**Amount (in Rs.) Q x (A+B)**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Part-B/ Supply	Web based software solution (Shall be hosted on Cloud) inclusive of Head End System (database included), web application, data archiving , system integration with MDMS, End to end Communication from meter till TPCODL Control Center and any other item required to deploy the application for 250000 end Points	1	Lot				
Part-B/ Service	Facility Management services (inclusive of communication network after go live. Till go live, bidder has to bear the cost of the hosting system on cloud)	7	Years				
	Cloud Hosting Charges	7	Years				
	SIM card rental	2.5 Lac (on need basis)	Per card/ per month				
Total (Part-B)							
Total (Part-B) Rupees in words		Rs. (----------) Only.					
Total All Inclusive Cost of Ownership (Part-A +B)		In Figure Rs.					
		In words Rs. (----------) Only.					

NOTE:

- The overall period of the rate contract shall be for a period of 2 years and prices shall be firm till the validity of contract. Release order shall be issued as per requirement of TPCODL.
- The bids will be evaluated commercially on the overall lowest cost in line item basis.
- The unit price with GST in column no. 7, is landed price for TPCODL at their Central store Bhubaneswar / Cuttack.
- The bidders are advised to quote prices strictly in the above format. Failing to do so, bids are liable for rejection.
- The bidder must fill each and every column of the above format. ***Mentioning "extra/inclusive" in any of the column may lead for rejection of the price bid.***
- No cutting/ overwriting in the prices is permissible.
- The quantity may vary as per actual requirement.
- FMS charges shall not be less than 20% of the contract value.

Signature & Seal of the Bidder

ANNEXURE II

Technical Specifications –
Attached separately with the tender.

ANNEXURE III

Schedule of Deviations

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

Unless specifically mentioned in this schedule, the bid shall be deemed to confirm to the TPCODL's specifications:

S. No.	Clause No.	Tender Clause Details	Details of 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:

ANNEXURE IV

Schedule of Commercial Specifications

(The bidders shall mandatorily fill in this schedule and enclose it with the offer Part I: Technical Bid. In the absence of all these details, the offer may not be acceptable.)

S. No.	Particulars	Remarks
1.	Prices firm or subject to variation (If variable indicate the price variation clause with the ceiling if applicable)	Firm / Variable
1a.	If variable price variation on clause given	Yes / No
1b.	Ceiling	--------- %
1c.	Inclusive of Excise Duty	Yes / No (If Yes, indicate % rate)
1d.	Sales tax applicable at concessional rate	Yes / No (If Yes, indicate % rate)
1e.	Octroi payable extra	Yes / No (If Yes, indicate % rate)
1f.	Inclusive of transit insurance	Yes / No
2.	Delivery	Weeks / months
3.	Guarantee clause acceptable	Yes / No
4.	Terms of payment acceptable	Yes / No
5.	Performance Bank Guarantee acceptable	Yes / No
6.	Liquidated damages clause acceptable	Yes / No
7.	Validity (180 days) (From the date of opening of technical bid)	Yes / No
8.	Inspection during stage of manufacture	Yes / No
9.	Rebate for increased quantity	Yes / No (If Yes, indicate value)
10.	Change in price for reduced quantity	Yes / No (If Yes, indicate value)
11.	Covered under Small Scale and Ancillary Industrial Undertaking Act 1992	Yes / No (If Yes, indicate, SSI Reg'n No.)

Signature & Seal of the Bidder

ANNEXURE V

Checklist of all the documents to be submitted with the Bid

Bidder has to mandatorily fill in the checklist mentioned below:-

S. No.	Documents attached	Yes / No / Not Applicable
1	EMD of required value	
2	Tender Fee as mentioned in this RFQ	
3	Company profile/ organogram	
4	Signed copy of this RFQ as an unconditional acceptance	
5	Duly filled schedule of commercial specifications (Annexure IV)	
6	Sheet of commercial/ technical deviation if any (Annexure III)	
7	Balance sheet for the last completed three financial years; mandatorily enclosing Profit & loss account statement	
8	Acknowledgement for Testing facilities if available (duly mentioned on bidder letter head)	
9	List of Machine/ tools with updated calibration certificates if applicable	
10	Details of order copy (duly mentioned on bidder letter head)	
11	Order copies as a proof of quantity executed	
12	Details of Type Tests if applicable (duly mentioned on bidder letter head)	
13	All the relevant Type test certificates as per relevant IS/ IEC (CPRI/ ERDA/ other certified agency) if applicable	
14	Project/ Supply Completion certificates	
15	Performance certificates	
16	Client Testimonial/ Performance Certificates	
17	Credit rating/ Solvency certificate	
18	Undertaking regarding non blacklisting (On company letter head)	
19	List of trained/ Untrained Manpower	

Signature & Seal of the Bidder

Annexure VI

Acceptance Form for Participation In Reverse Auction Event

(To be signed and stamped by the bidder)

In a bid to make our entire procurement process more fair and transparent, TPCODL intends to use the reverse auctions as an integral part of the entire tendering process. All the bidders who are found as technically 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. TPCODL shall provide the user id and password to the authorized representative of the bidder. *(Authorization Letter in lieu of the same shall be submitted along with the signed and stamped Acceptance Form).*
2. TPCODL will make every effort to make the bid process transparent. However, the award decision by TPCODL would be final and binding on the supplier.
3. The bidder agrees to non-disclosure of trade information regarding the purchase, identity of TPCODL, bid process, bid technology, bid documentation and bid details.
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 TPCODL.
6. In case of intranet medium, TPCODL shall provide the infrastructure to bidders. Further, TPCODL 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 TPCODL.
8. The bidder shall be prepared with competitive price quotes on the day of the bidding 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 at TPCODL 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 TPCODL.
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 VII

General Conditions of Contract –
Attached separately with the tender.

Annexure VIII

Safety Policy and Safety Terms and Conditions – Attached separately with the tender.

Annexure IX

Tata Code of Conduct (TCoC) –
Attached separately with the tender.

Annexure X

Environment & Sustainability –
Attached separately with the tender.

Annexure XI

MANUFACTURER AUTHORIZATION FORM

(To be submitted on OEM's Letter Head)

Date: …….

Tender Enquiry No.: ……..

To,

Chief (Procurement & Stores)

The TP Central Odisha Distribution Limited,
Bhubaneswar.

Sir,

WHEREAS M/s. *[name of OEM]*, who are official manufacturers of …… having factories at *[address of OEM]* do hereby authorize M/s *[name of bidder]* to submit a Bid in relation to the Invitation for Bids indicated above, the purpose of which is to provide the following Goods, manufactured by us

……and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with the Special Conditions of Contract or as mentioned elsewhere in the Tender Document, with respect to the Goods offered by the above firm in reply to this Invitation for Bids.

We hereby confirm that in case, the channel partner fails to provide the necessary services as per the Tender Document referred above, M/s *[name of OEM]* shall provide standard warranty on the materials supplied against the contract. The warranty period and inclusion / exclusion of parts in the warranty shall remain same as defined in the contract issued to their channel partner against this tender enquiry.

Yours Sincerely,

For ……..

Authorized Signatory

Annexure XII

Format for Consortium Agreement

(On non-judicial stamp paper of appropriate value to be purchased in the name of executants companies or as required by the jurisdiction in which executed)

THIS Consortium Agreement executed on this ..... day of..... Two Thousand ..... By:

M/s. ..... a Company/ Partnership Firm/ Sole Proprietorship Organisation incorporated under the Act/Laws of ..... and having its Registered/Head office at ..... (hereinafter called the "Lead Member/First Member" which expression shall include its successors); and

M/s. ..... a Company/ Partnership Firm/ Sole Proprietorship Organisation incorporated under the Act/ Laws of ..... and having its Registered/Head office at ..... (hereinafter called the "Second Member" which expression shall include its successors).

The Lead Member/First Member and the other Member(s) shall collectively hereinafter be called as the "Consortium Members" for the purpose of submitting a bid proposal to TP Central Odisha Distribution Limited (Hereinafter referred to as 'TPCODL' or 'Owner') having its Registered Office/ Head office at IInd Floor, IDCO Towers, Janapath, Bhubaneswar, Odisha India (hereinafter called the "Owner") in response to the invitation of bids (hereinafter called as "Tender Ref No. ....." Document) Dated.....for Design, Manufacturing and Testing at Manufacturer's works, packing and forwarding, transport, insurance during transit, delivery in good condition at site, storage, preservation at site, handling at site, Erection, Testing after Erection, commissioning, performance testing and handing over of all equipment for Supply of Different Types of Smart Energy Meters And Supply, Installation, Testing, Commissioning, Integration, Communication, Operation & Maintenance Of Head End System Under SMART METERING SOLUTION (hereinafter called as "the Transaction").

AND WHEREAS the members of the Consortium together shall strictly comply the Bidder Eligible Criteria under the 'Tender Notice' of subject TOCODL Tender/ Notice Invitation Tender (NIT).

AND WHEREAS bid has been proposed to be submitted to the TOCODL by Lead Member based on this Consortium agreement between all the members, signed by all the members.

NOW THIS INDENTURE WITNESSETH AS UNDER:

In consideration of the above premises, in the event of the selection of Consortium as successful bidder, all the Parties to this Consortium Agreement do hereby agree abide themselves as follows:

1. M/s. ..... shall act as Lead Member for and on behalf of Consortium Members. The said Consortium Members further declare and confirm that they shall jointly and severally be bound and shall be fully responsible to the Owner for successful performance of the works, obligations under the same by the Lead Member are as follows:

2. Despite any breach by the Lead Member or other Member(s) of the Joint Venture/Consortium agreement, the Member(s) do hereby agree and undertake to ensure full and effectual and successful performance of the Contract with the Owner and to carry out all the obligations and responsibilities under the said Contract in accordance with the requirements of the Contract.

3. If the Owner suffers any loss or damage on account of any breach of the Contract or any shortfall in the performance in meeting the performance guaranteed as per the specification in terms of the Contract, the Member(s) of these presents undertake to promptly make good such loss or damages caused to the Owner, on its demand without any demur. It shall not be necessary or obligatory for the Owner to proceed against Lead Member to these presents before proceeding against or dealing with the other Member(s). The obligation of each of the member is absolute and not independent of the Consortium or any member.

4. The financial liability of the members of this Consortium agreement to the Owner, with respect to any of the claims arising out of the performance or non- performance of the obligations set forth in the said Consortium agreement, read in conjunction with the relevant conditions of the Contract shall, however, not be limited in any way so as to restrict or limit the liabilities of any of the members of the Consortium agreement. The liability of each member is absolute and not severable.

5. It is expressly understood and agreed between the Members to this Consortium agreement that the responsibilities inter se amongst the Members shall not in any way be a limitation of joint and several responsibilities and liabilities of the Members to the Owner. It is clearly understood that the Lead member shall ensure performance under the agreements and if one or more Consortium Member(s) fail to perform its /their respective obligations under the agreement(s), the same shall be deemed to be a default by all the Consortium Members. It will be open for the Owner to take any steps, punitive and corrective action including the termination of contract in case of such default also.

6. This Consortium agreement shall be construed and interpreted in accordance with the laws of India and shall be subjected to exclusive jurisdiction within Odisha in all matters arising there under.

7. In case of an award of a Contract, all the Members to the Consortium agreement do hereby agree that Lead Partner shall furnish all Bank Guarantee/Deposits for value as prescribed in the subject tender document (in form of an unconditional irrecoverable Bank guarantee in the prescribed format and as per terms of the contract).

8. It is further agreed that the CONSORTIUM agreement shall be irrevocable and shall form an integral part of the Contract, and shall continue to be enforceable till the Owner discharges the same. It shall be effective from the date first mentioned above for all purposes and intents.

9. Capitalized terms used but not defined herein shall have the meaning as assigned to them in the Tender Documents and/or the agreements.

10. In case of any dispute amongst the members of the Consortium, Owner shall not be in any way liable and also the Consortium members shall not be absolved from the contractual obligation in any manner.

IN WITNESS WHEREOF the Members to the CONSORTIUM agreement have through their authorized representatives executed these presents and affixed Common Seals of their companies, on the day, month and year first mentioned above.

Common Seal of <…….> has been affixed in my/our presence pursuant to the Board of Director's resolution dated ……

For Lead/First Member

Signature.. ……

Name... ……

Designation …….

(Signature of authorized representative)

Name... ……

Signature.. ……

Designation …….

Common Seal of <…….> has been affixed in my/our presence pursuant to the Board of Director's resolution dated ……

For Second Member

Signature.. ……

Name... ……

Designation …….

(Signature of authorized representative)

Name... ……

Signature.. ……

Designation …….

WITNESSES :

1.……

(Signature)

Name ……

(Official address)

2. ……

(Signature)

Name ……

(Official address)

Annexure XIII

FORM OF POWER OF ATTORNEY FOR CONSORTIUM

(On Non –Judicial Stamp Paper of Appropriate value to be Purchased in the Name of CONSORTIUM)

KNOW ALL MEN BY THESE PRESENTS THAT WE, the Members whose details are given hereunder…….. have formed a CONSORTIUM and having our Registered Office (s)/Head Office (s) at ……(hereinafter called the 'Consortium' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators and assigns) do hereby constitute, nominate and appoint M/s…….. a company/Electrical Contractor incorporated under the laws of ……..and having its Registered/Head Office at ……..as our duly constituted lawful Attorney (hereinafter called "Lead Member ") to exercise all or any of the powers for and on behalf of the CONSORTIUM in regard to bid for GED Tender Ref No. …… Dated……..for Design, Manufacturing and Testing at Manufacturer's works, packing and forwarding, transport, insurance during transit, delivery in good condition at site, storage, preservation at site, handling at site, Erection, Testing after Erection, commissioning, performance testing and handing over of all equipment for Supply of Different Types of Smart Energy Meters And Supply, Installation, Testing, Commissioning, Integration, Communication, Operation & Maintenance Of Head End System Under SMART METERING SOLUTION for which bids have been invited by the Owner namely TP Central Odisha Distribution Limited, to undertake the following acts :

(i) To submit proposal, participate and negotiate in respect of the aforesaid Bid – Specification of the Owner on behalf of the "Consortium".

(ii) To negotiate with Owner the terms and conditions for award of the contract pursuant to the aforesaid Bid and to sign the contract with the Owner for and on behalf of the "Consortium".

(iii) To do any other act or submit any document related to the above.

(iv) To receive, accept and execute the contract for and on behalf of the "Consortium".

(v) To submit the contract performance security in the form of an unconditional irrecoverable

Bank guarantee in the prescribed format and as per terms of the contract.

It is clearly understood that the Lead Member shall ensure performance of the contracts (s) and if one or more Member fail to perform their respective portion of the contracts (s), the same shall be deemed to be a default by all the Members.

It is expressly understood that this power of Attorney shall remain valid binding and irrevocable till completion of the Defect or liability period in terms of the contract.

The CONSORTIUM hereby agrees and undertakes to ratify and confirm all the whatsoever the said Lead Member quotes in the bid, negotiates and signs the Contract with the Owner and / or proposes to act on behalf of the CONSORTIUM by virtue of this Power of Attorney and the same shall bind the CONSORTIUM as if done by itself.

IN WITNESS THEREOF the Members Constituting the CONSORTIUM as aforesaid have executed these presents on this …… day of …….. under the Common Seal (s) of their Companies

for and on behalf of the Members of CONSORTIUM

1. ……

2. ……

The Common Seal of the above Members of the CONSORTIUM: The Common Seal has been affixed there unto in the presence of:

WITNESS 1

Signature ……

Name ……

Designation ……

Occupation ……

WITNESS 2

Signature ……

Name ……

Designation ……

Occupation ……

ANNEXURE-II

TECHNICAL SPECIFICATION

ANNEXURE-II

PART-A/ LOT-1

TECHNICAL SPECIFICATION FOR

TWO YEAR RATE CONTRACT FOR

SUPPLY OF

SINGLE PHASE SMART ENERGY METER

UNDER SMART METERING SOLUTION

Tender Enquiry No.

TPCODL/ P&S/ 167 (Part-A/ Lot-1)/ 2020-21

CONTENTS

1	**SCOPE**	This specification covers the technical requirements of design, manufacturing, testing & integration with Network Integration Card(NIC) for communication over 4G with fall back to 2G for communication network provider, at meter manufacturer's works, packing, forwarding, supply and unloading at store, of Single Phase Two Wire,230V, 10-60 A static smart energy meters of accuracy class 1.0 (here after referred as meters) complete with all accessories and meter box for efficient and trouble free operation. It is not the intent to specify completely herein all the details of technical design and construction of material. However, the material shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in manner acceptable to the TPCODL, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered material shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.
2	**APPLICABLE STANDARDS**	The equipment covered by this specification shall conform to the requirements stated in latest editions & amendments of relevant Indian/ International Standards and shall conform to the regulations of local statutory authorities.

a	IS 16444 Part-1 : 2015	A.C. Static Direct connected Watt hour Smart meter class 1.0 and 2.0
b	IS 13779 : 1999	A.C. Static Watt hour meter class 1.0 and 2.0
c	IS 15884 : 2010	A.C. direct connected static prepayment meters for active energy (class 1 & 2)
d	IS 15959 Part-1 : 2011	Data exchange for electricity meter reading, tariff and load control
e	IS 15959 Part 2 : 2016	Data exchange for electricity meter reading , tariff and load control
f	IEEE 802.15.4 : 2016	Standard for local and metropolitan area networks
g	IS 9000	Basic Environmental testing procedure for electrical and electronic items.
h	IEC 62052-11 : 2003	Electricity Requirements (AC) General Requirements Tests and Test conditions for A.C. Static Watt hour meter for active energy Class 1.0 and 2.0.
i	IEC 62053-21 : 2003	A.C. Static Watt hour meter for active energy Class 1.0 and 2.0
j	IS 15707 : 2006	Testing Evaluation installation and maintenance of AC Electricity Meters- Code of practice.
k	IEC 60068	Environmental testing.
l	CBIP–TR No.325	Specification for A.C. Static Electrical Energy Meters (latest amendment)
m	CEA Regulation: 2006	Installation and operation of meters Dtd: 17/03/2006 or latest amendment
n	IS 12346:1999	Testing Equipment For Ac Electrical Energy Meters
o	IS 11000	Fire Hazard Testing
p	IS 60529	Degree of protection provided by enclosure
q	ASTM D648	Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position

		r	IS 11731-1	Methods of test for determination of the flammability of solid electrical insulating materials when exposed to an igniting source, Part 1: Horizontal specimen method
		s	IS 11731-2	Methods of Test for Determination of Flammability of Solid Electrical Insulating Materials When Exposed to An Igniting Source, Part 2: Vertical Specimen Method
		t	ISO 75 Part 1 & 2	Determination of temperature of deflection under load

3	**CLIMATE CONDITIONS OF THE INSTALLATION**	Max. Ambient Temperature : 50 ^{0}C Average Ambient Temperature in peak summer months May to July : 40 ^{0}C Min. Ambient Temperature in winter months : 0 ^{0}C Relative humidity : 20 to 90% Average Annual Rainfall : 760 mm Average rainy days per annum : 60 days Max. Altitude above MSL : Not exceeding 300 meters Max. wind pressure : 126 kg/sq. m. Seismic level (horizontal ground acceleration) : 0.3 g Note- Atmosphere is generally laden with mild acid and dust suspended during dry months and subjected to fog in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.3 g.

4	**GENERAL TECHNICAL REQUIREMNTS**	**SNo**	**Description**	**Requirement**
		4.01	Type of the meter	Single phase two wire, static watt-hour, VAR-hour direct connected type smart meter without application of any Multiplication Constant. It consisting of measuring element(s),time of use of register(s),display, load switch and plug in type bi-directional communication module (NIC) all integral with the meter housing.
		4.02	Accuracy Class of the meter	1.0
		4.03	Basic Current (Ib) & rated Maximum current (Imax)	Ib= 10A; Imax= 60 A (Meter shall be able to continuously carry 120% of Imax, meeting the accuracy requirements)
		4.04	Reference Conditions for testing the performance of the meter	Vref = 230 V Frequency = 50Hz Temperature= 27 °C
		4.05	Operating Voltage	Meter shall be operational with required accuracy from0.6Vrefto 1.2 Vref. However meter shall withstand the maximum system Voltage of 440V (for minimum 5 min).
		4.06	Operating Frequency	50 Hz± 5%.
		4.07	Power Consumption	Voltage circuit: Maximum 5.0 W and 15 VA Current Circuit : Max 4VA (The additional power requirement during data transmission shall not exceed 7W per communication module).
		4.08	Starting Current	20mA (0.2% of Ib) (phase or neutral current)
		4.09	Short time over Current	1800 A for 0.01 sec (30Imax for one half cycle at rated frequency)

		4.10	Influence of heating	Temperature rise at any point of the external surface of the meter shall not exceed by more than 20K with an ambient temperature at 50deg C as per clause 9.4 of IS 13779.
		4.11	Rated Impulse with stand voltage	6 kV (shall be applied ten times with one polarity and then repeated with the other polarity.)
		4.12	AC withstand voltage for 1min	4 kV
		4.13	Minimum Insulation resistance at test voltage 500V +/- 50V DC Between frame &current, voltage circuits as well as auxiliary circuits connected together	5 Mega Ohms
		4.14	Mechanical requirements	Meter shall be in compliance with clause 12.3 of IS 13779
		4.15	Resistance to heat and fire	The terminal block and Meter case shall ensure safety against the spread of fire. These should not get ignited by thermal overload of live parts in contact with them as per clause 6.8 of IS 13779.
		4.16	Protection against Penetration of dust and water	Degree of protection: IP 51 as per IS 12063 or 60529, but without suction in the meter. Meter shall comply with clause 6.9 and 12.5 of IS 13779
		4.17	Resistance against Climatic influence.	Meter shall be in compliance with clause 12.6 of IS 13779.
		4.18	Electromagnetic Compatibility (EMC)	Meter shall be in compliance with clause 4.5 and 5.5 of IS 15884
		4.19	Accuracy requirements	Meter shall be in compliance with clause 11 of IS 13779.
		4.20	Power factor range	Zero lag to Zero lead. (For kVA/kVAh, meter shall be programed at default lag only configuration i.e. Lead to be treated as unity for kVA &kVAh calculations)
		4.21	Energy measurement	Fundamental energy +Energy due to Harmonics
		4.22	Connection Diagram	The connection diagram for the system shall be provided on terminal cover.
		4.23	Self-Diagnostic feature	The meter shall have indications on meter display, for anomaly/ unsatisfactory / non-functioning of (i) Real Time Clock (ii) RTC battery (iii) Non Volatile Memory (iv) NIC (v) Status of NIC (installed/ discovered/ normal)/ Signal Strength
		4.24	Initial start-up of meter	Meter shall be fully functional within 5 sec after reference voltage is applied to the meter terminals.

		4.25	Alternate mode of supply to the meters	In case of meter power failure, the reading/data should be retrieved with the help of battery or other power source.
		4.26	Sleep Mode	Meter shall not go in sleep mode. Display should not be OFF at any point of time when power up.
		4.27	Minimum Internal diameter of the terminal holes minimum Depth of the terminal holes	9.5mm(minimum) 22 mm + 1 mm
		4.28	Clearance between adjacent terminals	10 mm (minimum)
		4.29	Display	Backlit LCD, Scrolling, min. 10 seconds for each parameter. 6+1 digits LCD display (not for reading)
		4.30	Security feature	Programmable facility to restrict the access to the information recorded at different security level such as read communication, write communication, firmware selection from remote. Facility for Upgradation / Modification of Firmware shall be provided Following parameters shall be updated multiple times during life cycle of meters over the air : Post Paid to Prepaid mode and vice versa Import mode to export Mode and vice versa. Accordingly Display parameters shall be updated TOU shall be updated in meter. Meters should push mid night data on daily basis which should include CKWh, CKVAh, MD KW(Current-Rising), MD KVA (Current-Rising), TOD KWH(both off peak and peak) and TOD KVAh(both off peak and peak)
		4.31	Software and communication compatibility	The bidder shall supply software required for local HHU& Remote (AMI) connectivity including required training to use the software free of cost as required by utility or HES / Communication service provider. If this software can be used in a device readily available in market and can connect to meter through optical port or other communication port without any security checks / or with MR securities which OEM will provide; then, OEM can provide only software, else the device on which this software will run is also to be provided along with technical specification of this device.

		4.32	Calibration	Meters shall be software calibrated at factory and modifications in calibration shall not be possible at site by any means. There shall be provision for firmware update to change payment mode from **Prepaid to Postpaid** and vice versa; similarly for metering mode from **Import only to Export-Import** (NET mode) and vice versa, through proper authentication process remotely over the air (OTA). The change should be recorded as Transaction event. Billing should be done at that time of firmware upgrade so that readings at which this upgrade has happened are logged in meter and system. Display update shall be done accordingly remotely.
		4.33	Communication module of meter for AMI	As per clause no 1.2 (b) of IS 16444 PART-1. Meter should have provision of communication module compatible with both the variant mentioned in IS 16444 PART-1. This module should be able to get connected to the NAN / WAN network of service provider (4G/NB-IoT) of TPCODL. Meter should be able to provide required power supply to NIC provided by communication provider, if separately required, recommended/finalized by TPCODL. In case of 4G / NB-IoT based communication, a provision of local read via Bluetooth communication (Bluetooth module housed & enabled in NIC), has to be provided with HHU on the format which must be pushed to HES.
		4.34	Communication Layer Protocol	Should be as per clause 9.3 of IS 16444 PART-1
		4.35	Key Management and Security Feature	Should be as per IS 15959 Part-1 & Part- 2
		4.36	Usage Application	Indoor usage
		4.37	Ultrasonic welding / Chemical Bonding	Meter cover and body should be continuous &seamless ultrasonically welded only or should be chemically bonded.
4.1	**DISCONNECTOR SWITCH**	The meter shall have the facility of disconnecting and re-connecting the load of the meter from the remote and by authenticated command through Laptop/HHU at site by means of a built-in switch/relay. This operation shall be conducted with the help of a third party software which is owned by TPCODL, in over the air mode, on 4G with fall back provision on 2G Cellular , and in addition, by the manufacturer's own software which can be given through optical port using external modem / HHD by utility. Each operation of the switches shall be logged by the meter as an event with date, time stamp and snapshot parameters. This operation should be in line with clause 11 of IS 16444 PART-1, however over current tripping should be disabled by default while supply and should have easy enabling provision (with configurable threshold). TPCODL will decide the enabling of disconnection based on statuary guidelines and changes in future. The cumulative number of ON/OFF operations shall also be made available in meter data and HES. The make of the load switch should be of reputed make like Grooner, KG or equivalent			

and same shall be confirmed by the bidder during tendering. Switch shall be in compliance to IS 15884. Data-sheet of the dis-connector switch shall be submitted by the bidder(s), with the technical bid.

The brief technical particulars of this Disconnector/load switch are furnished below, bidders to comply for the same:-

S.NO	DESCRIPTION	REQUIREMENT
1	Operating Voltage range	130 V to 470 V
2	Operating Current range	20 mA to 72 A
3	Maximum switching power	22 kVA per phase/ per IS 15884 Annex G
4	No. of poles	2 nos. (one in phase and one in neutral)
5	Operation of switches	Simultaneous
6	Utilization Categories	UC2 or better
7	Min. number of operation	3000 (close, open each)

4.2 **4.2.1 NIC MODULE DETAILS & INTEGRATION FOR 4G BASED COMMUNICATION**

4.2.2.1 In case of 4Gbased meter, the NIC shall accommodate SIM card of any service provider and the same should be inter-operable, so that in case there is a change in service provider, NIC needs not to be changed.

4.2.2.2 The successful bidder of meter shall do the integration of NIC with TPCODL smart meter communication network and ensure end-to-end communication of complete meter data as desired in this specifications. The bidder shall mandatorily submit prototype meters for testing at TPCODL, before mass manufacturing.

4.2.2.3 The NIC is plug-in type & shall be replaceable at site in hot swappable condition, in event of any failure but it should be integrated in meter body in such way that it should have separate cover & sealing arrangement with screw.

4.2.2.4 In case of 4G based communication system, the bidder shall inform TPCODL during the technical bidding itself. The associated NIC dimensions and pin configurations should also be defined and got approved from TPCODL.

4.2.2.5 In case of 4G based communication system, bidder to mention details of power consumption of associated NIC and same should be in lines with clause 6.10 of IS 16444.

4.2.2.6 Further, the technical details and pin configuration of NIC shall be shared by the bidders, during detailed engineering.

4.2.2.7 Energy meter and NIC card Integration (both hardware and software)in a way to get desired data at HES and HHU, shall be the responsibility of bidder jointly with HES service provider and communication network provider.

4.2.2.8 Necessary support for Meter & NIC (as a unit) integration with TPCODL communication network upto HES, shall be extended by the bidder.

4.2.2.9 The integration document with associated test plans to be submitted by successful bidder during pre-manufacturing approvals (GTP, drawings & sample) and the same shall also be approved by TPCODL prior to mass manufacturing. Bidder shall

		arrange for integration testing . 4.2.2.10 TPCODL consider NIC as a part of meter. The bidder should have back to back Service Level Agreements (SLA) with NIC (RF) provider, communication network provider and component suppliers, meeting this specification 4.2.2.11 The NIC module placement in meter housing should be such that it is ensured that the NIC can be removed from meter without removing the meter from meter box. This NIC should be online field replaceable. 4.2.2.12 Meter should be able to identify if NIC has been removed or power failure has occurred. These 2 instances should be separately recorded in meter memory and should be reported back on time to time basis.
4.3	**a) Communication capabilities and software feasibilities**	4.3.1 The meter shall have facilities for data transfer locally through Meter Reading Instrument (MRI) (Using optical port/NIC card) and remotely by 4G with proper security via Plug in type NIC. Data transfer locally through optical port via MRI is desired along with data transfer through NIC card. The data downloaded in MRI/ Hand Held Device shall be integrated to HES data base. 4.3.2 It should be the responsibility of the bidder to ensure integration of meter into HES. For cellular fallback, the Module should have backward compatibility. The fall back provision shall be taken through optical port with external modem by TPCODL. Meter should be capable for sending all data from 4G NIC and optical port. 4.3.3 It shall be possible to reconfigure the meters for RTC, TOD slots reprogramming, DIP (Demand Integration period), billing date, display parameters etc. through proper authentication process locally through MRI and remotely over the air (OTA). Meter data should remain intact with timings. And billing should be done whenever any above mentioned attribute is changed. The change should be recorded as upgrade event. 4.3.4 Necessary keys if required for performing this reconfiguration operation should also be provided along with supply of meter lot & training to TPCODL staff on how to use it free of cost. Bidder to provide this support on a later stage also on the request of TPCODL without any cost implication. 4.3.5 Optical Communication port shall be available for communication. Communication ports shall not be affected by any type of injection /unauthenticated signals and having proper sealing arrangement. The complete data shall be downloaded within 5 minutes OTA. 4.3.6 Bidder to ensure integration of meter data with head end for data transfer as mentioned in specification. 4.3.7 Meter should be supplied to TPCODL along with integrated NIC card. NIC card should be plug in type with proper sealing arrangement. 4.3.8 The bidder shall supply software required for local (MRI) & remote (AMI) connectivity including required training to use the software free of cost. Bidder shall provide the communication protocol / APIs for communication with meter through local (MRI) /

		remote (AMI) as and when required by TPCODL free of cost during life time of meter. The bidder should provide DLMS compliance for Communication with the meter at Optical port and at HES. 4.3.9 Bidder should also provide software for changing/upgrading meter firmware in mass and should support integration of this software with HES. Bidder should also provide base computer software (BCS) for viewing the data downloaded through HES/MRI/laptop/HHU in separate PC/laptop. Android based or windows based HHU shall be preferred. 4.3.10 For purpose of exercising control, like outage management, the meter should send abnormalities at the consumers' end like Power failure (Last Gasp) instantly, Power Restoration (First Breath) as event. Additional exceptional events should also be communicated to HES by meter immediately after the occurrence. It should also indicate the restoration of the same event. 4.3.11 List of events to be reported should be configurable over the air(OTA). The meter should have "Last Gasp" and “First Breath” feature to facilitate sending alerts to the HES during fully powered off / On condition. 4.3.12 If there are 2 requests given for communication one from HES and other from local device, request from local device should supersede. 4.3.13 Meter Serial no will be used for tagging of all data of the meters in all database (at HES / MDM/ DCU level etc). However, it will be the responsibility of the Bidder to establish the complete communication solution involving all the meters in the system. Also, the Bidder must ensure that, the mode of communication used for 4G shall be consistent with the Government of India stipulations. Bidder should come out with it requirements for integration of meter with HES and MDMS clearly during tender submission. 4.3.14 The Bidder's supplied meter with third party communication module should have suitable hand-shaking features to allow a third-party MDMS (procured by TPCODL) to configure, command, read and control smart meters installed at site. The Bidder shall extend all necessary assistance in developing the adaptor software through a third-party for facilitating the above. 4.3.15 Integration of meter software’s with HES / MDMS for seamless transfer of data will also be in scope of bidder till the expiry of warranty of the meters. It is desired meter firmware up gradation/ selection should be available over the air. Meter should be able to change to prepaid mode if required with firmware upgrade. The required firmware and any required support for integration with HES shall be provided free of cost till the useful life of the meter. 4.3.16 Communication of the meter at optical port / OTA (NAN / WAN) should be as per IS 15959 (Part-2):2016. The optical port should be with proper locking arrangement. 4.3.17 Communication NIC/ network should be immune with any external Magnetic field/ ESD/ Jammer/ HV voltage influence such that it shall not affect the normal overall functionality. 4.3.18 Meter once powered up with NIC card should be self-detected and its basic name plate details & current readings are transferred to HES.

		4.3.19 The required OBIS codes will be finalized with successful bidder. The bidder can offer desired codes from Blue Book ensuing the codes reserved or standardized by Bureau of Indian standards. The reserved codes in BIS are to be used/utilized as per guidelines of BIS and remaining codes from blue book can be used for communication of additional features mentioned in this specifications. This is to be done strictly with written approval from TPCODL after verification of proposed codes by manufacturer. In future, if BIS adds any OBIS codes then the bidders to provide upgraded firmware with desired changes in consultation and approval of TPCODL competent authority. 4.3.20 Meter display should have provision for showing if NIC card if: 1. Installed, 2. Getting Network, 3. Latched with HES, 4. Communicating with HES. 4.3.21 If any tamper occurs in power off situation, it should be pushed as soon as the meter is powered on. 4.3.22 Bidder to provide facility for Up-gradation / Modification of Firmware. 4.3.23 TPCODL reserves the right that if required, TPCODL will hand over the SIM cards to OEM and supply will be accepted with SIM cards already installed and with communication already tested in 100 % meters. For this purpose, TPCODL HES will be used for confirming data availability 4.3.24 Following parameters may be updated multiple times during life cycle of meters over the air: Post Paid to Prepaid mode and vice versa Import mode to export Mode and vice versa. Accordingly Display parameters shall be updated remotely.
4.3	**b) IMMUNITY AGAINST EXTERNAL INFLUENCING SIGNALS**	**4.4.1 Magnetic Field:** Meter shall record accurate energy in case of any external influencing signals in line with IS 13779:1999 Cl.11.2 and variation in limits of error (upto 100% Imax) shall be as per the table 17 of IS 13779. Meter shall be immune to magnetic field such that it shall not affect the normal overall functionality However, in case of abnormal magnetic field as defined below meter shall perform as per the following actions: a) Meter shall log the event in its memory as" Magnet" with date and time stamp, the event logging threshold values as per table no. 1 in 4.6 b) The energy recording to shift on I max, Vref. with UPF. **Abnormal Magnetic field is defined as below;** a) Continuous DC magnetic induction: **>**0.20 Tesla ± 5% (Value of the magneto motive force to be applied shall be generally >10000 AT. b) AC magnetic induction: **>**10 milli Tesla (if produced with circular metal core with square cross section as specified in CBIP latest report with 2800 AT) **c)** Permanent Magnet: Immune up to 0.5T and Event logging **>**0.5T. **4.4.2. Electrostatic Discharge (ESD)** Meter shall be immune up to 50 kV and shall record accurate energy as per IS-13779:1999/CBIP-325. Meter shall log the event into memory as 'ESD' with date &

		time stamp for any ESD greater than 50 kVwith snap shot the event logging threshold values as per table no. 1 in 4.6 4.4.3 The shielding around the meter shall be such that it does not get affected by high Voltage and high energy or low energy impulse when comes in contact with meter from any side. 4.4.4 Meter should be immune to high/low frequency jammer devices. Meter shall log the event in its memory as 'JAMMER' with date and time stamp, the threshold values as per table no. 1 in 4.6. 4.4.5 The meter should be immune or log the tamper on application of any other higher magnetic field of any frequency waves, micro waves like magnetron etc. the threshold values as per table no. 1 in 4.6.
	c) NEUTRAL DISTURBANCE & OTHER TAMPERS	4.5.1 The meter shall log the event in memory on thresholds defined in table 1 in 4.6 4.5.2 The meter shall not saturate on passage of direct current, which can cause the meter either to stop recording/ record inaccurately. DC injection shall be tested both in phase and neutral. Measurement by meter shall not get influenced by injection of chopped signal/ DC signal/ DC pulse up to 330V (both + & - DC) and for any value beyond this of any low frequency and harmonics. Meter shall log the event in to memory as ''Neutral Disturbance' with date & time stamp the thresholds are as per table no. 1 in 4.6 4.5.3 The meter shall record energy proportional to the current and V Ref (230V) when any of the tamper circuits enclosed as per annexure1 are used to tamper energy using any type of diode or a variable resistance or a variable capacitance, energy saving device. Or any DC injection as per 4.5.2. 4.5.4 In any tamper when then voltage falls below 190V then only the meter will start defraud recording at Vref, UPF and actual RMS current. When voltage is above 190V only, event shall be recorded as per prevailing tamper condition. **Other tampers:** 4.5.5 **Single Wire tamper**: When neutral is disconnected from both load side and supply side, the meter should record energy as per rated parameters (Vref)actual current and UPF& subsequently log the event as per table no.1 in 4.6. 4.5.6 **Current mismatch** - Meter should logged current mismatch event as per thresholds in table no.1. Priority of logging this event in memory of meter is higher than EL. Further, earth LED shall glow & log event as per its own logic irrespective of this logic.
4.4	**ABNORMAL TAMPER CONDITIONS**	4.6.1 Meter shall be immune to the influence of Magnet, ESD, Jammer, microwaves as per clause 4.53 during all the tamper conditions of Annexure-I. The meter shall record forward energy under any abnormal conditions as given in the Annexure- I, for all 38 tamper conditions, with above abnormal influencing signals. 4.6.2 All the tamper events mentioned in table no. 1, shall be logged in the memory of the meter with date and time stamp of occurrence (of abnormal event) and restoration (of normal supply) along with instantaneous electrical parameter (Voltage, Current (

phase and neutral)), energy (kWh &KVAh), PF ,. The event register compartment size shall be as per table no.1

4.6.3 Multiple occurrences of same event, with different time stamps should not be logged without restoration of first occurrence, except for the case of Top Cover Open.

4.6.4 Meter shall latch & store cumulative count of events logged /occurred/stored in memory of meter from the date of energization till life of meter.

4.6.5 For all tamper events the time stamp and snapshot parameters shall be recorded at the start time of event for occurrence (T1) and for restoration the time stamp and snapshot parameters shall be recorded at the end time of the event (T3). During abnormal & tamper conditions, the current shall be recorded as active current and line current. Each such event shall be provided with minimum count as per table no.1, to avoid loss of data amidst usual events (like power failure) due to the limitation of FIFO.

4.6.6 Tamper event logging along with snapshot of occurrences & restorations shall be as per table no.1. Persistence time for occurrence and restoration for the events along with their threshold values shall be as per table no. 1 given below

4.6.7 All tamper/event logging thresholds values shall be configurable remotely over the air (OTA).

4.6.8 The Cover Open tamper detection should be through heavy duty, sturdy micro switches such that it should not log false event on vibration or impact during handling or testing.

TABLE NO.1

Persistence Time for Occurrences	Persistence Time for Restoration	Threshold Value for Occurrence of Events	Threshold Value for Restoration of Events	Compartment Size
ESD/JAMMER = immediate (record only 1 event on first application & only one event for next 1min)	ESD/JAMMER = 0 Hr 01 Min 0 sec (ESD) (should restore after 1 min. of last application)	Immunity up to 50 KV with NIC and logging of event>50 KV	Removal of ESD/ Jammer signal	25
Magnet = 0 Hr 2 Min 0 sec (MAG)	Magnet = 0 Hr 2 Min 0 sec (MAG)	>0.5 Tesla for permanent magnet OR DC magnetic induction >0.2T OR AC magnetic induction > 10 mT	<0.5 Tesla for permanent magnet OR DC magnetic induction < 0.2T or AC magnetic induction <10 mT	25
Meter Top Cover Open (TC Open) Immediate	Meter Top Cover Open (TC Open) immediate	If meter top cover is opened	NA	05 (Stay put Type)

		Single Wire = 0 Hr 30 Min 0 sec (SW)	Single Wire = 0 Hr 2 Min 0 sec (SW)	a) At a current of >500mA under tamper condition of neutral missing (where battery is used for voltage reference). Meter will perform the fraud energy registration above 500mA assuming Vref (from battery) and UPF. b) At a current of >1 amps under tamper condition of neutral missing (where third CT is used for voltage reference). Meter will perform the fraud energy registration above 1A assuming Vref (from third CT) and UPF. c) Condition no. 38 of Annexure I (Timer test): The timer operation duration on/off time for 30 seconds with constant current for 30 min.	Voltage > 190 V	25
		Neutral Disturbance = 0 Hr 01 Min 0 sec (ND)	Neutral Disturbance = 0 Hr 02 Min 0 sec (ND)	Voltage >145% of Vref, Current >10% Ib OR Frequency < 47 Hz OR Frequency > 53 Hz OR DC voltage / signal/ pulse/ chopped signal injection/ as per the conditions of clause 4.5.4	Voltage <115% of Vref Current > 10% Ib AND Frequency>47Hz OR Frequency<52Hz	25
		Current Mismatch = 0 Hr 10 Min 0 sec (CM)	Current Mismatch = 0 Hr 02 Min 0 sec (CM)	(In –Ip) ≥ 20 % of Ib AND (In>Ip)	In –Ip< 20 % of Ib	25
		Low Voltage Check = 0 Hr 30 Min 0 sec (LVC)	Low Voltage Check = 0 Hr02 Min 0 sec (LVC)	Voltage < 70% of Vref AND current > 2% Ib	Voltage > 80% of Vref AND current > 2% Ib	25
		Power OFF = 0 Hr 05 Min 0 sec	Power On = immediate	Actual Voltage OFF	Actual Voltage ON	25

		Over Load 0 Hr 30 Min 0 sec (OL) (If enabled)	Over Load = 0 Hr 2 Min 0 sec (OL) (If enabled)	> 120% Imax	< 100% Imax	25
		Microwave immediate (record only 1 event on first application & only one event for next 1min)	Microwave 0 Hr 01 Min 0 sec (should restore after 1 min. of last application)	Any higher frequency magnetic waves, micro waves > 10 mT	Removal of device	25
		Temperature Rise (TR) = 0 Hr 30 Min 0 sec	Temperature Rise(TR) = 0 Hr 02 Min 0 sec	Temperature >70˚C	Temperature <60˚C	25 (Stay put type)
		NIC card Removed (Immediate)	NIC Card inserted (Immediate)	On removal of card	On insertion of card	20
		Earth Leakage (EL) = 0 Hr 30 Min 0 sec	Earth Leakage (EL) = 0 Hr 02 Min 0 sec	Difference between phase and neutral current > 6.25 % of Ib	Difference between phase and neutral current <6.25%of Ib	10

4.5 EVENT COMPARTMENTS

4.7.1 The size of the event compartments should be such that, all above events (in table no.1 and other required events defined in various clauses of this documents) are accommodated in the assigned event category compartment i.e. if in case of voltage compartment assigned to 4 number of events, then the minimum size of this compartment should be such that, it should accommodate sum of all maximum number of events as marked above table no. 1.

4.7.2 Transaction events compartment size shall be minimum 100 events.

4.6 GENERALCONSTRUCTIONS

The Meter shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal conditions, so as to ensure especially personal safety against electric shock, safety against effect of excessive temperature, protection against spread of fire, protection against penetration of solid objects, dust and water. All parts, which are subject to corrosion under normal working conditions, shall be protected effectively. Any protective coating shall not be liable to damage by ordinary handling or damage due to exposure to air, under normal working conditions. The meters shall be designed and manufactured using SMT (Surface Mount Technology) components.

Preferably shunt should be fitted for measuring current in phase element & neutral element may have either CT or shunt or hall-effect sensor with proper isolation. The shunt used in the current circuit must be of high-quality having high thermal stability and temperature co-eff. It should be E-beam/ spot welded. In case of hall effect sensor, meter should record energy as per the requirement of this specification in normal and tamper conditions. There should not be any connector or joint in the CT secondary connections from PCB. CT shall be soldered on PCB. The battery cell shall be button/coin type leak-proof.

All the material and electronic power components used in the manufacture of the meter shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy as given below or any other equivalent make with the strict approval of TPCODL:

Sno	Component Function	Requirement	Makes and Origin

		1.	Measurement/ computing chips	The Measurement/ computing chips used in the meter shouldbe with the Surface mount typealong with the ASICs	USA:Analog Devices, Cyrus Logic, Atmel, Phillips, Freescale semiconductor, Texas Instruments, ST Microelectronics South Africa: SAMES Japan: NEC, Renesas
		2.	Memory chips/NVM	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostaticdischarges. The life of NVM shall be 15 years.	USA: Atmel, National Semiconductors, Texas Instruments, Phillips, Microchip Japan :Hitachi or OkiSwiss: STMicro
		3.	Display modules	The display modules should bewell protected from the external UV radiations. The display visibility should be sufficient toread the meter mounted between height of 0.5m and 2m. The construction of the modulesshould be such that the displayed quantity should not disturbed with the life of display. Should be with Green LED background. It should betrans-reflective STN typeindustrial grade with extended temperature range.	Taiwan:Holtek Singapore:Bonafied Technologies Korea:Advantek China:Xiamen,Trulysemiconductor
		4.	Optical port	Optical port should be used to transfer the meter data to meter reading instrument. The mechanical constructionof the port should be such to facilitate the data transfer easily. It should be magnetic locking type	USA: National Semiconductors Holland / Korea: Phillips Taiwan: MAXIM, Everlight, Japan:Hitachi
		5	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	A class consumer
		6.	Electronic components	The active & passive componentsshould be of the surface mounttype& are to be handled & soldered by the state of art assembly processes.	USA: National Semiconductors, Atmel,Phillips, Texas Instruments, Vishay Japan:Hitachi, Oki, AVX or Ricoh Korea: Samsung
		7.	Battery	Lithium with guaranteed life of 15 years	Varta / Tedirun /Vitzrocell / Sanyo or equivalent.
		8.	Micro controller and RTC having separate battery	The accuracy of RTC shall be asper relevant IEC / IS standards and RTC shall be provided with separate battery in its ckt.. The micro controller shall be of superior	USA: Philips , Dallas, Atmel, Motorola, Texas Instruments, ST Microelectronics Japan: NEC or Oki,

				quality from reputed make with long life.	Renesas
		9.	Temperature sensor	Temperature sensor shall be internal to the meter and its accuracy shall be as per relevant IEC / IS standards. The OEM test report to be furnished. With good performance till life of meter.	USA: Philips , Dallas, Atmel, Motorola Japan: NEC or Oki

4.7	**METER BODY**	5.1.1 Meter body shall be made of unbreakable, high grade, fire retardant reinforced Insulating material (protective Class II) with FV0 Fire Retardant, self - extinguishing, UV stabilize, recyclable (first use) and Anti oxidation properties. 5.1.2 The minimum thickness of the meter enclosure shall be 2mm. 5.1.3 Meter base shall be opaque with polycarbonate LEXAN 500R or equivalent (i.e. chart of Lexan 500R compared with the alternative material) on prior approval from the TPCODL. (the bidders should submit material data sheet in technical bid) 5.1.4 Meter cover shall be transparent with polycarbonate LEXAN 143R/943A or equivalent on prior approval from the TPCODL. (the bidders should submit material data sheet in technical bid) **5.1.5 Meter cover & base shall be provided with continuous and seamless Ultrasonic welding or chemical bonding such that it cannot be opened without breaking the enclosure. Front cover & base shall be such that it is not possible to cut & open the meter without certainly damaging the meter body and by no means shall an attempt to reassemble would not leave physical evidence. The damage evidences should be visible externally & should be traceable in such a way that attempts can be proved in court of law.** 5.1.6 The meter body shall be sealed in such a way that opening/ disengagement of meter base and cover is possible only after breaking the seal(s). 5.1.7 Unidirectional screws to be used on meter covers where ever required. 5.1.8 The Meter body shall be such that the liquid or chemical shall not reach the electronic parts if liquid is injected from meter body such as meter terminals, push button, display, NIC card casing etc. Necessary protection and water tight sealing to be provided at terminals and Push buttons etc.

5	**TERMINALS, TERMINAL BLOCK**	**5.2.1**	**Even after any attempts to disengage the terminal block, it should not get disengaged, opened or loosen from any side. Any attempt to disengage the terminal block should certainly damage the meter body with physical evidences. The damage evidences should be visible externally& should be traceable in such a way that attempts can be proved in court of law.**
		5.2.2	Terminals may be grouped in terminal block having adequate insulating properties and mechanical strength. In order to satisfy such requirements when choosing insulating materials for the terminal block adequate testing of materials shall be taken into account.
		5.2.3	Terminal block and terminal cover shall be of a material which complies with the requirements of IS11731 (part 1) method FH1. The material of which the terminal block is made shall be capable of passing the Heat Deflection temperature test given in ISO 75 for temperature of 135°C and pressure of 1.8 M Pa. Tested as per ISO 75-2/A or ASTM D648.
		5.2.4	The terminal block shall be of opaque with polycarbonate LEXAN500R or equivalent first use material (complying to above requirement) on prior approval from the TPCODL. (the bidders should submit the relevant material data sheet in technical bid)
		5.2.5	The terminals and connections shall be suitable to carry up to 120 % of Imax continuously. The size, design & material of Bus-bar /Shunt/Terminal shall be with suitable cross sectional area, so that temperature rise at the terminal block will not be more than 35°C above ambient temperature of 45°C at 120% of I max loading for 06 hrs. continuous. This test shall be repeated at CPRI/ERDA on any meter for every 25000 meters or whenever required, without any cost implications towards TPCODL. It shall also be done on tender sample & on pre-manufacturing sample. The process for the same shall be: The energy meter shall be supplied at reference voltage with actual heating load of 120% of Imax on both phase & neutral circuits.
		5.2.6	To get the desired temperature rise & avoid hot spots the design of the each terminal screw shall be Allen head screw & shall be operated with Allen key. The Size of the Allen screw shall be 6mm dia. The material and plating details of terminals screw shall be provided.
		5.2.7	The terminal block, the terminal cover and the meter case shall ensure reasonable safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them.
		5.2.8	**Temperature sensor** to be placed at a suitable location that the temperature inside meter could be sensed properly and the meter should be programmed in such way that on reaching the set threshold value (as per tamper table) the event should go to the HES.
		5.2.9	The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there is no risk of loosening or undue heating. Terminals shall be preferably with Allen screw with at least 6 mm dia. for better contact area. Terminal & screw should not be damaged during regular opening and tightening. (MS terminals not accepted)
		5.2.10	The Aluminum cable of 2x10 sq.mm shall be used as service line. Hence the terminals shall be provided with Zinc plating or tinning or suitable compatible

		coating to avoid the bimetallic effect at the joints with AL core of cable. 5.2.11 Internal diameter of the terminal holes shall be minimum 9.5 mm; minimum clearance between adjacent terminals shall be 10 mm. minimum Depth of the terminal holes shall be of 22 mm. 5.2.12 Terminal block shall be such that the risk of corrosion resulting from contact with any other metal part is minimized. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material. 5.2.13 The preferred arrangement of terminals shall be linear and if any change is offered then suitable arrangement for testing at our testing lab (MMG and MTL) to be provided by bidder free of cost as per requirement. 5.2.14 Minimum two number of terminal screws to be provided per terminal wire.
5.1	**TERMINAL COVER**	5.3.1 Terminal cover should have four number U shaped cuts with the width of 12mm each for incoming and outgoing wires. 5.3.2 Terminal cover shall be short type and shall be transparent with polycarbonate LEXAN 143R/943A or equivalent on prior approval from the TPCODL (the bidders should submit the relevant material data sheet in technical bid). 5.3.3 The terminal cover shall be 25 mm length from bottom of terminal block in line with meter base. Terminal cover should have four number of U cuts for cable entry in such way that it should cover up to center of the terminal holes for easy installation of cover after incoming and outgoing cable connections. The U-Cuts should be such aligned that they do not fall in straight line with terminal holes of meters if seen from bottom and no straight metallic wire / rod should be able to access terminal holes if terminal cover is fixed on its position. 5.3.4 Appropriate space shall be available for incoming /outgoing cables without damaging/stressing terminal cover (terminal cover design shall be as per the TPCODL approval). After sealing the cover, terminals shall not be accessible without breaking the seals. 5.3.5 The terminal cover design should be such that the sealing screw locking provision on cover should have min dimension of 3mmx3mm. (Excluding seal lock hole) 5.3.6 The terminal cover should open on the top side, during connection of the cables. The side opening of terminal cover is not acceptable due to additional opening space requirement. 5.3.7 The system connection diagram shall be provided on the terminal cover.
5.2	**SEALING OF METER**	5.4.1 Reliable sealing arrangement shall be provided to make the meter tamper evident and to avoid fiddling or tampering by unauthorized persons. 5.4.2 For this, one no. Polycarbonate seal and three no. Hologram seal (on Left, Right & Top side) shall be provided by the bidder. 5.4.3. One no polycarbonate seal shall be provided by the TPCODL. This seal shall be fix on right hand side of meter.

		5.4.4. All the seals with unique serial numbers shall be fixed on meter body by the bidder at his works before calling for inspection. 5.4.5 One sealing provision shall be provided at meter terminal cover, such that terminal shall not be accessible without breaking the seals. All the seals shall be provided on front side only and as per the TPCODL specification. Rear side sealing arrangement shall not be accepted. Bidder shall provide seals be as per CEA regulation (2006). Only patented seals to be used as per CEA requirements. 5.4.6 Plug in type NIC card cover should have proper sealing arrangement and should be sealed with TPCODL polycarbonate seal. 5.4.7 The bidder shall provide TPCODL (MMG store and MTL) the soft record of polycarbonate seal and hologram seal serial number and NIC card serial number used against each meter serial number along with its position (RHS/LHS/Top/ NIC Cover) in tabular form for every lot of meter.
5.3	**TOD FEATURE**	The meter shall be capable of measuring Cumulative Energy (kWh), and MD (kW/KVA) with time of day (TOD) registers having 8 zones & 02 seasons (no. of zones & time slot shall be programmable by MRI/OTA with adequate security level and in one to one /broadcast mode over the air). Time duration of these slots should be available in the meter data, at HES. Current TOD (during tender) to be given is as below, Slots | Time Slot | Jan-Dec T1 Off-Peak | 0000-0600 | Register 1 T2 Normal | 0600-2400 | Register 2 **# The bidder to ask TPCODL for latest TOD timing slots before manufacturing of every lot.**
5.4	**MD INTEGRATION**	The MD integration period shall be 15 minutes (integration period-programmable by MRI at site and also through AMR with adequate security level). The MD resetting shall be automatic at the 1st of the month i.e. 0000 hours of 1st day of the month. Manual MD reset button shall not be available. Last twelve MD values shall be stored in the memory and one to be displayed in the Auto scroll mode. MD shall be recorded and displayed with minimum three digits before decimal and minimum two digits after decimal points. MD integration shall be Block Type Demand.

5.5	**PARAMETERS IN BCS**	All these parameters shall be downloaded locally or remotely and interpreted in PC/Laptop. All the parameters shall be recorded and memorized in its Nonvolatile Memory (NVM). The corresponding nonvolatile memory shall have a minimum retention time of 15 years. It is to be ensured that any data which is pushed / pulled from meter must have Meter Sr. No. as one of the parameters. Time-sync with RTC and over-writes on drift threshold. Clarity on event logged in memory and server time-stamps matching Fail to be log in memory in the following conditions only in BCS not in display a) RTC fail b) NVM memory fail c) Battery fail NIC fail should be depicted on Meter display and suitable indication should be available at HES
5.6	**LOAD SURVEY(FOR PRE-PAID, POST-PAID & NET METER MODE)**	Meter serial number and NIC serial number shall be recorded and communicated for all profiles of data. The meter shall be capable of recording load profile of 45 days with 15 min integration period for kWh, kVAh, KW, kVA, Voltage, Phase and Neutral current, Metering Current, Power Factor, Temperature (°C) for ON days/time. Meter shall be capable of recording daily Energy and Demand 00:00 to 24:00 Hrs kWh and kW, kVAh and kVA in BCS for 45 days. Midnight energy value of cumulative KWh, KVAh along with Current (Rising Demand) KW and Current (Rising Demand) KVA along with daily consumption kWh should be available in meter memory for last 45 days. Load survey data should be at least with 5 decimal place
5.7	**INSTANTANEOUS PARAMETERS**	Meter serial number and NIC serial number shall be recorded and communicated for all profiles of data. Meter shall be capable for following Instantaneous Parameters in Memory and should be available in BCS.

Meter Sr.No.	
NIC Sr. No.	
Meter Type	1P 2W 10-60A
Meter date & Time	DD MM YYYY HH MM SS
Voltage	000.000V
Phase Current	00.000A
Neutral Current	00.00A
Power factor	0.000
Instantaneous Frequency	00.000Hz
Instantaneous Load	Active
Present Cumulative Energy	Active- kWh
Present Cumulative Energy	Apparent- kVAh
Cumulative Power Off Duration	00000
Cumulative Power ON Duration	00000
Cumulative Tamper count	00000
Billing date	dd:mm:yy

		Terminal Block Temperature (˚ C) | No. of disconnector operation (Open) | 00000 No. of disconnector operation (Close) | 00000
5.7.1	**GENERAL INFORMATION**	Meter serial number and NIC serial number shall be recorded and communicated for all profiles of data. Meter shall be capable for providing below mentioned general parameters in BCS and HES **Meter Serial number** Firmware Version Manufacturer's Name Manufacturing Date (MM/YY) Meter Type Meter Class Meter Constant Meter Voltage Rating Meter Current Rating TOD profile
5.7.2	**BILLING PARAMETERS**	Meter serial number and NIC serial number shall be recorded and communicated for all profiles of data. Both Export-Import mode, below mentioned parameters should be for both Export and Import. 1) Maximum Demand (Reset date, Current Month &12 History, time zone register wise) a) MD - Abs Active Load/kW b) MD - Abs Apparent 2) Billing Dates (12 History) 3) Cumulative Energy (Reading date Current Month&12 History, time zone register wise) kWh and kVAh 4) Consumption (Reading date, Current Month &12 History, time zone register wise) kWh and kVAh 5) Average Power factor (12 History) 6) Mode of operation of dis-connector switch 7) Monthly power ON/OFF hours Last five modes with date & time of switching with cumulative energy parameters of kWh,TOD1kWh,TOD2 kWh, kVAh,TOD1kVAh,TOD2 KVAh
5.7.3	**TRANSACTIONS**	All the changes in software of meter to be logged along with date & time stamp and readings. Meter should do billing if any billing related transaction is done.
5.7.4	**DISPLAY UNITS**	The display unit shall be Pin type built-in liquid crystal display (Permanently backlit type LCD). The LCD shall be of STN (Super Twisted Nematic) construction suitable for maximum temperature withstands 65 C degree and minimum temperature withstands 0degree C during normal operating condition. The LCD display shall have a wide viewing angle of 120 degree. When the meter is not energized the electronic display need not be visible. The display shall

		not be affected by electrical, magnetic disturbances and ESD. The display should be readable in direct sunlight. **The back lit must be green in color for good visibility of digits in sunlight.** Phase Indication should be Green LED only. The kWh register shall have minimum 6 digits(without decimal) LCD display and size of the digits shall be minimum 10mmx5mm. **Cumulative energy (kWh) shall be displayed without decimal in auto scroll mode. (However decimal shall be available in push button mode for high resolution display for testing).**
5.7.5	**AUTO SCROLL/ PUSH BUTTON MODE WITH POST-PAID PAYMENT MODE**	Persistence time for each parameter shall be 10 second. Values followed by header shall be avoided. (i.e. if MD1 is displayed in Auto scroll mode, Header (MD1) and value (say 5.23 KW) shall be shown simultaneously; it shall not be shown in successive displays. Off time shall not be available in auto scroll mode between each cycle. Auto scroll mode is restored after 10 sec, if push button is not operated. Display should not be stuck for any tamper events. There should not be any decimal point in the energy values. Following shall be continuously displayed in auto scroll and push button mode in the given order: **A. Post Paid without TOD**

Display	**Display 1**	**Display 2**
Scroll Process	**Auto**	**Push**
LCD Check	1	1
Meter Sr. No. (The nine digit Serial no. to be displayed with sequence 3 + 6 digits at a time, completer no. in single shot is preferred)	2	2
TAMPER*/OK	3	3
Date	4	4
Time	5	5
Cum. kWh	6	6
Cum. kVAh	7	7
Current Month MD kW	8	8
Current Month MD kVA	9	9
Last Month (history 1) kWh	10	10
Last Month (history 1) kVAh	11	11
Last Month (history 1) MD kW	12	12
Last Month (history 1) MD kVA	13	13
Phase Current	14	14
Neutral current	15	15
Inst. Voltage	16	16
Inst. Phase Power	17	17
Inst. Neutral Power	18	18
Status of Load Switch (connect or disconnect)	19	19
High Resolution kWh	-	20

High Resolution kVAh	-	21
Magnetic Tamper count	-	22
Latest Magnetic tamper occurrence date	-	23
Latest Magnetic tamper occurrence Time	-	24
ESD Tamper count	-	25
Latest ESD tamper occurrence date	-	26
Latest ESD tamper occurrence time	-	27
TC Open tamper count	-	28
TC Open occurrence date of very first event	-	29
TC open occurrence time of very first event	-	30
Count of Connect	-	31
Date & Time of Last Occurrence	-	32,33
Count of disconnect	-	34
Date & Time of Last Occurrence	-	35,36

B. Post-Paid with TOD

Display	**Display 1**	**Display 2**
Scroll Process	**Auto**	**Push**
LCD Check	1	1
Meter Sr. No	2	2
TAMPER*/OK	3	3
Date	4	4
Time	5	5
Cum. kWh	6	6
Cum. kVAh	7	7
TOD Cum. kWh (T1,T2,)	8,9,	8,9,
TOD Cum. kVAh (T1,T2,)	10,11,	10,11
Current Month MD kW	12	12
Current Month MD kVA	13	13
Last Month (history 1) kWh	14	14
Last Month (history 1) kVAh	15	15
Last Month (history 1) TOD Cum. kWh (T1,T2,)	16,17	16,17
Last Month (history 1) TOD Cum. kVAh (T1,T2,)	18,19	18,19
Last Month (history 1) MD kW	20	20
Last Month (history 1) MD kVA	21	21
Phase Current	22	22
Neutral current	23	23
Inst. Voltage	24	24
Inst. Phase Power	25	25
Inst. Neutral Power	26	26
Status of Load Switch (connect or disconnect)	27	27

High Resolution kWh	-	28
High Resolution kVAh	-	29
Magnetic Tamper count	-	30
Latest Magnetic tamper occurrence date	-	31
Latest Magnetic tamper occurrence Time	-	32
ESD Tamper count	-	33
Latest ESD tamper occurrence date	-	34
Latest ESD tamper occurrence time	-	35
TC Open tamper count	-	36
TC Open occurrence date of very first event	-	37
TC open occurrence time of very first event	-	38
Count of Connect	-	39
Date & Time of Last Occurrence	-	40,41
Count of disconnect	-	42
Date & Time of Last Occurrence	-	43,44

All these parameters shall be downloaded locally or remotely and interpreted in PC/Laptop. All the parameters shall be recorded and memorized in its Non Volatile Memory (NVM).The corresponding non-volatile memory shall have a minimum retention time of 10 years. Last twelve months history data (kWh reading and MD and event as above with date and time) shall be available in the Non Volatile Memory.

All meters to be supplied in postpaid, import mode only, until unless specifically intimated. Bidder to provide software to convert meter to any mode over the air by sending command through HES.

5.8 AUTO SCROLL/ PUSH BUTTON MODE WITH PRE-PAID PAYMENT MODE

Persistence time for each parameter shall be 10 second. Values followed by header shall be avoided. (i.e. if MD1 is displayed in Auto scroll mode, Header (MD1) and value (say 5.23 KW) shall be shown simultaneously; it shall not be shown in successive displays. Off time shall not be available in auto scroll mode between each cycle. Auto scroll mode is restored after 10 sec, if push button is not operated. Display should not be stuck for any tamper events. There should not be any decimal point in the energy values.

Following shall be continuously displayed in auto scroll and push button mode in the given order:

A. Pre-Paid without TOD

Display	**Display 1**	**Display 2**
Scroll Process	**Auto**	**Push**
LCD Check	1	1
Meter Sr. No	2	2
TAMPER*/OK	3	3
Date	4	4
Time	5	5
Cum. kWh	6	6
Cum. kVAh	7	7
Current Month MD kW	8	8
Current Month MD kVA	9	9

Last Month (history 1) kWh	10	10
Last Month (history 1) kVAh	11	11
Last Month (history 1) MD kW	12	12
Last Month (history 1) MD kVA	13	13
Phase Current	14	14
Neutral current	15	15
Inst. Voltage	16	16
Inst. Phase Power	17	17
Inst. Neutral Power	18	18
Status of Load Switch (connect or disconnect)	19	19
Current Balance Amount (Current Balance)	20,21	20,21
Current Balance Date & Time	22,23	22,23
Total Balance at Last Recharge(Previous Balance)	24,25	24,25
Last Recharge Amount	26,27	26,27
Last Recharge Date & Time	28,29	28,29
High Resolution kWh	-	30
High Resolution kVAh	-	31
Magnetic Tamper count	-	32
Latest Magnetic tamper occurrence date	-	33
Latest Magnetic tamper occurrence Time	-	34
ESD Tamper count	-	35
Latest ESD tamper occurrence date	-	36
Latest ESD tamper occurrence time	-	37
TC Open tamper count	-	38
TC Open occurrence date of very first event	-	39
TC open occurrence time of very first event	-	40
Count of Connect	-	41
Date & Time of Last Occurrence	-	42,43
Count of disconnect	-	44
Date & Time of Last Occurrence	-	45,46

B. Pre-Paid with TOD

Display	**Display 1**	**Display 2**
Scroll Process	**Auto**	**Push**
LCD Check	1	1
Meter Sr. No	2	2
TAMPER*/OK	3	3
Date	4	4
Time	5	5
Cum. kWh	6	6
Cum. kVAh	7	7

		TOD Cum. kWh (T1,T2)	8,9	8,9
		TOD Cum. kVAh (T1,T2)	10,11	10,11
		Current Month MD kW	12	12
		Current Month MD kVA	13	13
		Last Month (history 1) kWh	14	14
		Last Month (history 1) kVAh	15	15
		Last Month (history 1) TOD Cum. kWh (T1,T2)	16,17	16,17
		Last Month (history 1) TOD Cum. kVAh (T1,T2)	18,19	18,19
		Last Month (history 1) MD kW	20	20
		Last Month (history 1) MD kVA	21	21
		Phase Current	22	22
		Neutral current	23	23
		Inst. Voltage	24	24
		Inst. Phase Power	25	25
		Inst. Neutral Power	26	26
		Status of Load Switch (connect or disconnect)	27	27
		Current Balance Amount (Current Balance)	28	28
		Current Balance Date & Time	29,30	29,30
		Total Balance at Last Recharge(Previous Balance)	31	31
		Last Recharge Amount	32	32
		Last Recharge Date & Time	33,34	33,34
		High Resolution kWh	-	35
		High Resolution kVAh	-	36
		Magnetic Tamper count	-	37
		Latest Magnetic tamper occurrence date	-	38
		Latest Magnetic tamper occurrence Time	-	39
		ESD Tamper count	-	40
		Latest ESD tamper occurrence date	-	41
		Latest ESD tamper occurrence time	-	42
		TC Open tamper count	-	43
		TC Open occurrence date of very first event	-	44
		TC open occurrence time of very first event	-	45
		Count of Connect	-	46
		Date & Time of Last Occurrence	-	47,48
		Count of disconnect	-	49
		Date & Time of Last Occurrence	-	50,51

All these parameters shall be downloaded locally or remotely and interpreted in PC/Laptop. All the parameters shall be recorded and memorized in its Non Volatile Memory (NVM).The corresponding non-volatile memory shall have a minimum retention time of 10 years. Last twelve months history data (kWh reading and MD and event as above with date and time)

		shall be available in the Non Volatile Memory. **All meters to be supplied in postpaid, import mode only, until unless specifically intimated. Bidder to provide software to convert meter to any mode over the air by sending command through HES.**
5.8.1	**AUTO SCROLL/ PUSH BUTTON MODE WITH EXPORT-IMPORT (NET) MODE**	Persistence time for each parameter shall be 10 second. Values followed by header shall be avoided. (i.e. if MD1 is displayed in Auto scroll mode, Header (MD1) and value (say 5.23 KW) shall be shown simultaneously; it shall not be shown in successive displays. Off time shall not be available in auto scroll mode between each cycle. Auto scroll mode is restored after 10 sec, if push button is not operated. Display should not be stuck for any tamper events. There should not be any decimal point in the energy values. Following shall be continuously displayed in auto scroll and push button mode in the given order:

A. NET mode without TOD

Display	**Display 1**	**Display 2**
Scroll Process	**Auto**	**Push**
LCD Check	1	1
Meter Sr. No	2	2
TAMPER*/OK	3	3
Date	4	4
Time	5	5
Cum. kWh Import	6	6
Cum. kVAh Import	7	7
Cum. kWh Export	8	8
Cum. kVAh Export	9	9
Current Month MD kW	10	10
Current Month MD kVA	11	11
Last Month (history 1) kWh Import	12	12
Last Month (history 1) kVAh Import	13	13
Last Month (history 1) kWh Export	14	14
Last Month (history 1) kVAh Export	15	15
Last Month (history 1) MD kW	16	16
Last Month (history 1) MD kVA	17	17
Phase Current	18	18
Neutral current	19	19
Inst. Voltage	20	20
Inst. Phase Power	21	21
Inst. Neutral Power	22	22
Status of Load Switch (connect or disconnect)	23	23
High Resolution kWh Import	-	24
High Resolution kWh Export	-	25
High Resolution kVAh Import	-	26

		High Resolution kVAh Export	-	27
		Magnetic Tamper count	-	28
		Latest Magnetic tamper occurrence date	-	29
		Latest Magnetic tamper occurrence Time	-	30
		ESD Tamper count	-	31
		Latest ESD tamper occurrence date	-	32
		Latest ESD tamper occurrence time	-	33
		TC Open tamper count	-	34
		TC Open occurrence date of very first event	-	35
		TC open occurrence time of very first event	-	36
		Count of Connect	-	37
		Date & Time of Last Occurrence	-	38,39
		Count of disconnect	-	40
		Date & Time of Last Occurrence	-	41,42
		Total Count of all Events	-	43

B. NET mode with TOD

Display	**Display 1**	**Display 2**
Scroll Process	**Auto**	**Push**
LCD Check	1	1
Meter Sr. No	2	2
TAMPER*/OK	3	3
Date	4	4
Time	5	5
Cum. kWh Import	6	6
Cum. kVAh Import	7	7
TOD Cum. kWh Import (T1,T2)	8,9,	8,9,
TOD Cum. kVAh Import (T1,T2)	10,11	10,11
Cum. kWh Export	12	12
Cum. kVAh Export	13	13
TOD Cum. kWh Export (T1,T2)	14,15	14,15
TOD Cum. kVAh Export (T1,T2)	16,17	16,17
Current Month MD kW	18	18
Current Month MD kVA	19	19
Last Month (history 1) kWh Import	20	20
Last Month (history 1) kWh Export	21	21
Last Month (history 1) kVAh Import	22	22
Last Month (history 1) kVAh Export	23	23
Last Month (history 1) MD kW	24	24
Last Month (history 1) MD kVA	25	25
Phase Current	26	26

		Neutral current	27	27
		Inst. Voltage	28	28
		Inst. Phase Power	29	29
		Inst. Neutral Power	30	30
		Status of Load Switch (connect or disconnect)	31	31
		High Resolution kWh Import	-	32
		High Resolution kWh Export	-	33
		High Resolution kVAh Import	-	34
		High Resolution kVAh Export	-	35
		Magnetic Tamper count	-	36
		Latest Magnetic tamper occurrence date	-	37
		Latest Magnetic tamper occurrence Time	-	38
		ESD Tamper count	-	39
		Latest ESD tamper occurrence date	-	40
		Latest ESD tamper occurrence time	-	41
		TC Open tamper count	-	42
		TC Open occurrence date of very first event	-	43
		TC open occurrence time of very first event	-	44
		Count of Connect	-	45
		Date & Time of Last Occurrence	-	46,47
		Count of disconnect	-	48
		Date & Time of Last Occurrence	-	49,50
		Total Count of all Events	-	51

All these parameters shall be downloaded locally or remotely and interpreted in PC/Laptop. All the parameters shall be recorded and memorized in its Non Volatile Memory (NVM).The corresponding non-volatile memory shall have a minimum retention time of 10 years. Last twelve months history data (kWh reading and MD and event as above with date and time) shall be available in the Non Volatile Memory.

All meters to be supplied in postpaid, import mode only without TOD Display, until unless specifically intimated. Bidder to provide software to convert meter to any mode over the air by sending command through HES.

5.8.2	**OUTPUT DEVICE**	1. **Pulse Rate:** The meters shall have a suitable test output device. Red color blinking LED (marked as imp/kWh) shall be provided in the front. This device shall be suitable for using with sensing probe used with test benches or reference standard meters. Meter constant shall be indelibly printed on the name plate as imp / kWh. 2. **EL LCD Indicator-** The meter shall be provided with suitable earth mark indicator for Earth Leakage. The EL Indicator shall glow when there is a difference of 6.25 %Ib between phase and neutral current. This should be recorded as an event in memory and communicated to HES. 3. **Communication LCD indicator-**Meter display shall have  indication in context to NIC. The blinking should be slow when NIC is detected; blinking should

		be fast when NIC had searched the network and it should be stable when it is successfully latched to the HES. 4. **Load Switch LCD indicator-** The meter shall be provided with suitable LCD indication for condition of load switch (Close/open). LCD should show when load switch is open.
5.8.3	**NAME PLATE AND MARKING**	Meters shall have a name plate clearly visible and effectively secured against removal. The name plate data should be laser printed. The base color of Name plate shall be blue(as of TPCODL logo)Indelibly and distinctly marked with all essential particulars as per relevant standards along with the following. i. Manufacturer's name ii. Type designation iii. Number of phases and wires iv. Serial number (Meter serial number shall be laser printed on name plate instead of sticker). v. Month and Year of manufacture vi. Unit of measurement vii. Reference voltage ,frequency viii. Ref. temperature if different from 27 deg. C ix. Rated basic and maximum Current x. Meter constant (imp/kWh) xi. 'BIS' Mark xii. Class index of meter xiii. "Property of TPCODL" xiv. Purchase Order No. & date xv. Guarantee period. xvi. Rated frequency xvii. Sign of double square xviii. Country of manufacture. xix. Symbol of load switch. xx. Communication Tech for WAN and NAN(with carrier frequency) xxi. Category However the following shall be printed in bar code on the meter nameplate.(shall be laser printed on name plate instead of sticker) All data shall be laser printed on meter along with Sr.NO and date of manufacturing. No sticker to be used to avoid loss of data in event of fire. Content Format for bar code: **TPCODL MMYY XXXXXXXXX**(9-digit Serial no.) Bidder should ensure that each NIC provided in meter is having laser printed Sr. No., MFG date, 'Property of TPCODL' marking, PO/RO no.& date(same as that of meter PO/RO)
5.9	**TESTS**	All routine, acceptance & type tests shall be carried out on the meter and meter body separately in accordance with the relevant IS/IEC from CPRI/ ERDA. All routine/acceptance tests shall be witnessed by TPCODL/his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted in addition to the tests specified in IS/IEC.
6.0	**TYPE TEST**	1) All tests as defined in the latest updated versions of IS 16444 Part-1: 2015, IS 13779:1999, IS15959 Part-1&2: 2016 and IS 15884: 2010. 2) Test against abnormal magnetic influence as per clause 5.6.2 of CBIP TR 325. 3) Meter shall have BIS certification as per IS16444 part-1& IS15959 part-2
7.0	**ROUTINE TEST**	1) AC High Voltage test (Clause no. 12.7.6.3 of IS 13779) 2) Insulation test (Clause no. 12.7.6of IS 13779) 3) Test on limits of error due to variation in current (Clause no. 11.1 of IS 13779)

<table>
<tr><td></td><td></td><td>4) Test of starting current (Clause no. 11.5 of IS 13779)
5) Test of no load condition (Clause no. 12.13 of IS 13779)</td></tr>
<tr><td>7.1</td><td>ACCEPTANCE TEST</td><td>1) AC High Voltage test (Clause no. 12.7.6.3 of IS 13779)
2) Insulation test (Clause no. 9.5 of IS 13779)
3) Test on limits of error (Clause no. 11.1 of IS 13779) with following loads:
<table>
<tr><td>120% I max(72A)</td><td>I max (60A)</td><td>Ib(10A)</td><td>0.5 Ib (5A)</td><td>0.1Ib (1A)</td><td>0.05Ib (0.5A)</td></tr>
<tr><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 Lead and 0.5 lag</td><td>UPF</td></tr>
</table>
4) Test of meter constant (Clause no. 11.6 of IS 13779)
5) Test of starting current (Clause no. 11.5 of IS 13779)
6) Test of no load condition (Clause no. 12.13 of IS 13779)
7) Test of repeatability of error (Clause no. 11.7 of IS 13779)
8) Test of power consumption (Clause no. 9.1 of IS 13779)
9) Test for Immunity against external influencing signal as per the TPCODL specification
10) Test for Immunity against DC Immunity as per the TPCODL specification
11) Test for Immunity against Tamper conditions as per the TPCODL specification
12) Error measurements with 38 abnormal condition as per annexure I along with magnet, ESD and microwave (if not possible during inspection the meter from lot shall be tested at MTL)
13) Test to Influence of Harmonics (Table no. 17 & 20 of IS 13779)
14) Supply voltage and frequency variation test (as per clause 11.2 of IS 13779)
15) Testing of self-diagnostic features, as per TPCODL specification
16) Tamper count increment and logging with date and time in meter database, as per TPCODL specification
17) All tests as defined in IS15959(Part-2): 2016
18) Functionality of communication module as defined inIS 16444 part1
19) Smart meter communicability as per table no.A28 of IS 15959 (part-2)
20) Meter reading on HES demand, Scheduled meter reading from HES, remote firmware upgrade from HES and all programming request from HES to be simulated and checked during inspections.
21) Physical check of NIC and replaceable ease of the NIC module in meter & logging</td></tr>
<tr><td>7.2</td><td>METER BOX</td><td>Acceptance Tests
Physical verification of dimensions of the box.
Compatibility of the box for housing the Meter and ensuring ease of connecting and reading the meter.
Test for mechanical strength.
.
Routine Tests :
The routine test certificates for the following shall be furnished for approval of the purchaser.

Physical verification of dimension of the box.

Compatibility of the box for housing the meter ensuring ease of connecting and the reading the meter.
Meter box shall be of polycarbonate transparent type (Degree of protection-IP55)
Cable entry to meter box should be from side and gland should be such aligned that cable should enter meter box in upward direction to ensure that in case of rain water does not enter meter box by flowing along the cable.</td></tr>
</table>

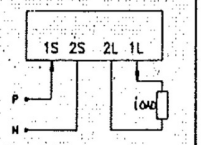
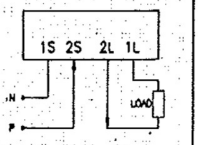
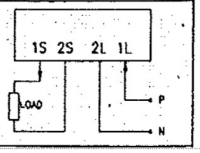
		Meter Box should have push button compatible with meters push button. Box should have optical port grove in line with meter optical port slot. There should be locking provision available for meter optical cord. The arrangement should be such that meter can be read through optical cord without opening the meters box. Meter Box should be hinge type. Meter Should be pre-fitted in meter box when supplied. Terminal of the meters should not be accessible through Glands of the meters once the cable in installed. There should be minimum 20 mm spacing between meter and meter box from all sides. From front it should be minimum 10 mm and behind it should be minimum 5 MM.
7.3	**SPECIAL TEST**	1) The bidder shall demonstrate the communication capability of the meter through communication modes as defined in the specification before conducting acceptance tests. 2) Temperature rise test on terminal block will be valid as per clause 5.2.5 of this specification.
7.4	**TYPE TEST CERTIFICATE**	The bidder shall furnish the type test certificates of the meter for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ ERDA/ UL laboratory as per BIS 16444 part-1. For communication testing any national approved laboratory or international acclaimed lab or equivalent will also suffice at the discretion of TPCODL. For technical evaluation of the tender, we may consider Type test report as per IS 13779. In such case the Bidder should provide IS16444 compliant test report before starting of supply of meters. Type test should have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPCODL.
7.4	**PRE-DESPATCH INSPECTION**	Inspection can be conducted at any stage of manufacture at the discretion of the TPCODL and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Equipment shall be subject to inspection by a duly authorized representative of the TPCODL. Bidder shall grant free access to the places of manufacture to TPCODL's representatives at all times when the work is in progress. Inspection by the TPCODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCODL. Following documents shall be sent along with material: a) Pre dispatch Inspection Test reports b)MDCC issued by TPCODL c)Invoice in duplicate d)Packing list e)Drawings & catalogue f) Guarantee / Warrantee card

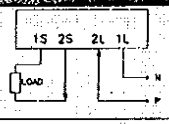
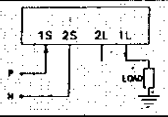
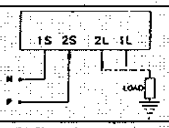
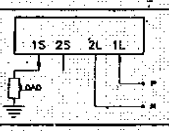
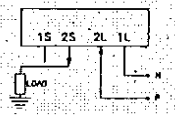
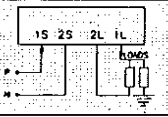
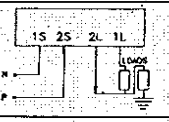
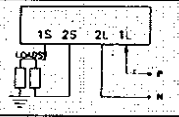
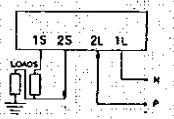
		g)Delivery Challan h)Other Documents (as applicable) Note-Photographs of packed lot clearly showing s.no of meters whose inspection call has been requested should be sent along with letter for inspection call. Two meters from the offered lot, if deemed necessary, shall be tested for all tampers at TPCODL laboratory for compliance to anti tamper feature before MDCC. The inspectors shall free to take any two meters from offered lot for testing at our Lab. Bidder should check and ensure each meter and reset each meter for any event logged for any tamper.
8.0	**INSPECTION AFTER RECEIPT AT STORE**	The material received at TPCODL's store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Plant Engineering department.
9.0	**GUARANTEE**	Bidder shall stand guarantee towards design, materials, workmanship & quality of process / manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the TPCODL up to a period of at least 60 months from the date of commissioning or 66 months from the date of last supplies made under the contract whichever is earlier, Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Company, failing which the TPCODL will be at liberty to get it replaced/rectified at bidder's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the bidder or from the " Security cum Performance Deposit" as the case may be. Bidder shall own responsibility for all internal component with an end to end agreement with individual component manufacturer.
10.0	**PACKING**	1. Bidder shall ensure that all material covered under this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit. The material used for packing shall be environmentally friendly. Packing and transportation shall be as per IS 15707:206 clauses 9.1 and 9.2. 2. Individual meter should be packed in separate box. Routine test report (with min. tests as defined in 7.2) of the individual meter shall be kept inside each card board carton of the meter. **3.** On back side of RTC the bidder shall print a picture of the meter with its small details for consumer to know about meter. **4.** The softcopy of the routine test certificate of each meter to be provided with each lot to TPCODL, MMG stores at Bhubaneswar **5.** The routine test certificate shall contain results & all tests of clause no. 7.2. **6.** Bar code containing information of meter Sr. No should be pasted on the outer most box in which single / group of meters are transported
11.0	**SAMPLE**	**Tendering stage:** Bidders are required to manufacture 04 numbers of sample meters as per the TPCODL specification (sealed, unsealed and openable base and cover to view/test the inner circuits)and submit the samples (non-returnable) along with bid for approval. The tender sample as per IS 13779 & IS 15959 shall be acceptable for verification and other checks. Bidder to demonstrate all communication features during sample testing.

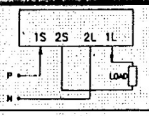
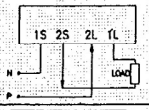
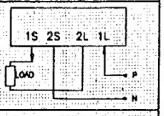
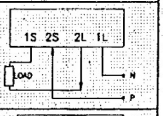
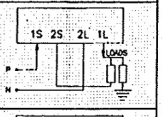
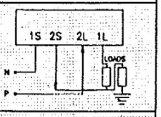
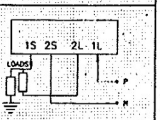
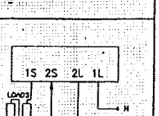
		Pre-manufacturing approvals: The successful bidder shall submit four prototype samples of meters at Meter Testing Lab, Power House, Bhubaneswar, for further testing and compliance as per specifications and get approval before mass manufacturing. Following accessories to be submitted along with sample at both stages: 1) Detailed manual 2) Communication cords 3) Tamper logic sheet 4) Display parameter annunciator 5) BCS 6) Internal connection diagram.
12.0	**TRAINING**	Suitable training to be arranged for TPCODL representatives, for operation and handling of every software and hardware regarding communication between meter & HHU, meter & HES, without any cost implications towards TPCODL.
13.0	**QUALITY CONTROL**	The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. Quality should be ensured at the following stages: • At PCB manufacturing stage, each board shall be subjected to computerized bare board testing. • At insertion stage, all components should undergo computerized testing for conforming to design parameter and orientation. • Complete assembled and soldered PCB should undergo functional testing using Automatic Test Equipment (ATEs). • Prior to final testing and calibration, sample meters shall be subjected to aging test (i.e. meters will be kept in ovens for 24 hours at 55 Deg. C temperature and atmospheric humidity under real-life condition at its full load current. After 24 hours meter should work satisfactorily) The TPCODL's engineer or its nominated representative shall have free access to the bidder's/manufacturer's works to carry out inspections any point of time.
14.0	**MINIMUM TESTING FACILITIES**	Bidder shall have adequate in-house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards/TPCODL specification. The bidder shall have duly calibrated Reference Standard meter of Class 0.1 or better accuracy or better.
15.0	**MANUFACTURING ACTIVITIES**	The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart shall be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order. **GTP Approval shall be mandatory to start manufacturing.**
16.0	**SPARES, ACCESSORIES AND TOOLS**	1. Bidder to be provide free of cost 02 nos. of jig for retrieving data from memory of meter with every new design of meter in which previous jig supplied cannot be used. Jig should be such that NVM can be push fit on this jig and data can be retrieve from this NVM. 2. Fifty 50 nos. of optical cord to be provided in first lot or after any design change for

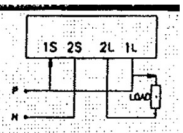
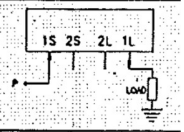
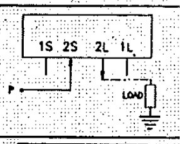
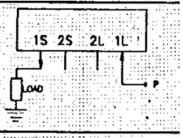
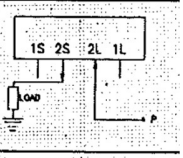
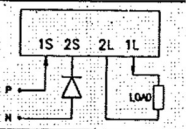
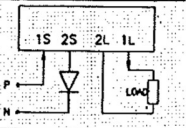
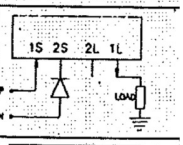
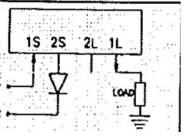
		retrieving the data of meter through optical port. Once supplied, it is not required in subsequent lots. 3. 10 number of HHUs with 1 Lac. Meters, for local optical port communication should be provided by the successful BA, without any cost implication towards TPCODL. With any lesser number of meters ordered, a pro-rata based number of HHUs should be provided.
17.0	**DRAWINGS AND DOCUMENTS**	Following drawings & Documents shall be prepared based on TPCODL specifications and statutory requirements and shall be submitted with the bid: a) Completely filled-in Technical Parameters. b) General arrangement drawing of the meter c) Terminal Block dimensional drawing d) Mounting arrangement drawings. e) General description of the equipment and all components with makes and technical requirement f) Type Test Certificates g) Experience List After the award of the contract, soft copies of following drawings, documents, describing the equipment in detail shall be forwarded for approval: **Bidder shall subsequently provide soft copy of all the drawings, GTP, data-sheet of dis-connector switch, data-sheet/ comparative analysis (of material of terminal block, terminal cover, terminal screw, meter body, meter base), Test certificates and integration documents with HES for the final approval of TPCODL, before mass manufacturing. All the documents & drawings shall be in English language.**
18.0	**GUARANTEED TECHNICAL PARTICULARS**	Clause-wise compliance to this specification.

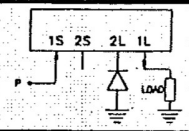
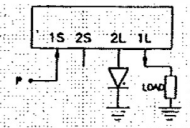
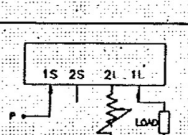
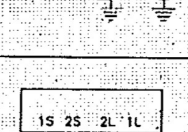
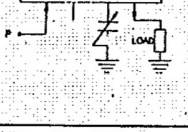
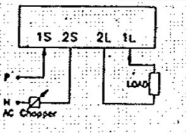
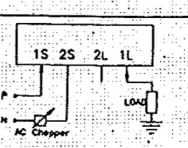
Annexure -1

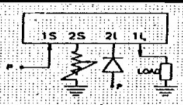
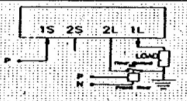
Condition No.	LCD Display	Description	Graphical View
1		NORMAL WIRING	
2		NORMAL WIRING, VOLTAGE REVERSED	
3		PHASE & NEUTRAL INTERCHANGED, CURRENT REVERSED	

Condition No.	LCD Display	Description	Graphical View
4		PHASE & NEUTRAL INTERCHANGED, CURRENT REVERSED, VOLTAGE REVERSED	
5		FULL LOAD EARTH RETURNED	
6		FULL LOAD EARTH RETURNED, VOLTAGE REVERSED	
7		FULL LOAD EARTH RETURNED ,VOLTAGE INTERCHANGED & CURRENT REVERSED	
8		FULL LOAD EARTH RETURNED, VOLTAGE INTERCHANGED & CURRENT REVERSED, VOLTAGE REVERSED	
9		PARTIAL LOAD EARTH RETURNED	
10		PARTIAL LOAD EARTH RETURNED, VOLTAGE REVERSED	
11		PARTIAL LOAD EARTH RETURNED, VOLTAGE INTERCHANGED & CURRENT REVERSED	
12		PARTIAL LOAD EARTH RETURNED, VOLTAGE INTERCHANGED & CURRENT REVERSED, VOLTAGE REVERESED	

Condition No.	LCD Display	Description	Graphical View
13		NEUTRAL CURRENT REVERSED	
14		PHASE CURRENT REVERSED, VOLTAGE REVERSED	
15		PHASE CURRENT REVERSED, VOLTAGE INTERCHANGED	
16		NEUTRAL CURRENT REVERSED, VOLTAGE INTERCHANGED & REVERSED	
17		PARTIAL LOAD EARTH RETURNED & NEUTRAL CURRENT REVERSED	
18		PARTIAL LOAD EARTH RETURNED & NEUTRAL CURRENT REVERSED, VOLTAGE REVERSED	
19		PARTIAL LOAD EARTH RETURNED & NEUTRAL CURRENT REVERSED, VOLTAGE INTERCHANGED	
20		PARTIAL LOAD EARTH RETURNED & NEUTRAL CURRENT REVERSED, VOLTAGE REVERSED, VOLTAGED INTERCHANGED	

21		CURRENT BYPASSED	
22		NEUTRAL REMOVAL (MISSING)	
23		NEUTRAL REMOVAL (MISSING), VOLTAGE REVERSED	
24		NEUTRAL REMOVAL (MISSING) & CURRENT REVERSED, VOLTAGE INTERCHANGED	
25		NEUTRAL REMOVAL (MISSING) & CURRENT REVERSED, VOLTAGE REVERSED, VOLTAGE INTERCHANGED	
26		DIODE REVERSED IN NEUTRAL	
27		DIODE IN NEUTRAL	
28		DIODE REVERSED IN NEUTRAL, LOAD EARTHED	
29		DIODE IN NEUTRAL, LOAD EARTHED	

Condition No.	LCD Display	Description	Graphical View
30		REVERSED DIODE EARTHED IN OUPUT NEUTRAL, LOAD EARTHED	
31		DIODE EARTHED IN OUTPUT NEUTRAL; LOAD EARTHED	
32		VARIABLE RESISTOR EARTHED IN OUTPUT NEUTRAL, NEUTRAL MISSING, LOAD EARTHED	
33		VARIABLE CAPACITANCE EARTHED IN OUTPUT NEUTRAL,NEUTRAL MISSING, LOAD EARTHED	
34		CHOPPER IN NEUTRAL	
35		CHOPPER IN NEUTRAL, LOAD EARTHED	
36		CHOPPER EARTHED IN OUTPUT NEUTRAL, NEUTRAL MISSING, LOAD EARTHED	

Condition No	LCD Display	Description	Graphical View
37		VARIABLE RESISTOR EARTHED IN NEUTRAL, DIODE IN OUTPUT NEUTRAL, LOAD EARTHED	
38		TIMER IN OUPUT NEUTRAL, LOAD EARTHED	

ANNEXURE – II

OBIS Codes for Single Phase Smart Energy Meter			
S. No.	**Instantaneous Profile**	**OBIS Code**	**OBIS Source**
	Instantaneous Profile	1.0.94.91.0.255	IS 15959 part-2
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Voltage	1.0.12.7.0.255	IS 15959 part-2
3	Phase Current	1.0.11.7.0.255	IS 15959 part-2
4	Neutral Current	1.0.91.7.0.255	IS 15959 part-2
5	Signed power factor	1.0.13.7.0.255	IS 15959 part-2
6	Frequency	1.0.14.7.0.255	IS 15959 part-2
7	Apparent Power – KVA	1.0.9.7.0.255	IS 15959 part-2
8	Signed Active Power - kW (+ Forward; -Reverse)	1.0.1.7.0.255	IS 15959 part-2
9	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-2
10	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS 15959 part-2
11	Maximum Demand KW Import/forwarded	1.0.1.6.0.255	IS 15959 part-2
12	Maximum Demand KVA Import/forwarded	1.0.9.6.0.255	IS 15959 part-2
13	Cumulative Power ON duration in min	0.0.94.91.14.255	IS 15959 part-2
14	Cumulative Tamper count	0.0.94.91.0.255	IS 15959 part-2
15	Cumulative Billing count	0.0.0.1.0.255	IS 15959 part-2
16	Cumulative programming count	0.0.96.2.0.255	IS 15959 part-2
17	Cumulative Energy KWh Export	1.0.2.8.0.255	IS 15959 part-2
18	Cumulative Energy KVAh Export	1.0.10.8.0.255	IS 15959 part-2
19	Load Limit function status (Connect/disconnect attribute 2 value)	0.0.96.3.10.255	IS 15959 part-2
20	Load Limit in KW	0.0.17.0.0.255	IS 15959 part-2
21	Number of power failures	0.0.96.7.0.255	IS 15959
22	Billing Date	0.0.0.1.2.255	IS 15959 part-2
23	Temperature	0.0.96.9.128.255	TPCODL specific
24	Number of load switch (connect/disconnect) operations	0.0.96.50.1.255	TPCODL specific
25	Cumulative Over voltage Tamper counts	1.0.12.36.0.255	TPCODL specific
26	Cumulative Low voltage Tamper counts	1.0.12.32.128.255	TPCODL specific
27	Cumulative Current reverse Tamper counts	1.0.11.128.128.255	TPCODL specific
28	Cumulative Over current Tamper counts	1.0.11.36.0.255	TPCODL specific
29	Cumulative Earth Tamper counts	1.0.11.128.131.255	TPCODL specific
30	Cumulative Magnet Tamper counts	0.0.96.50.0.255	TPCODL specific
31	Cumulative ND Tamper counts	1.0.96.50.0.255	TPCODL specific
32	Cumulative Single wire Tamper counts	1.0.96.50.1.255	TPCODL specific

33	Cumulative Over load Tamper counts	1.0.1.36.0.255	TPCODL specific
34	Cumulative Comms removal Tamper counts	0.0.96.50.3.255	TPCODL specific
35	Cumulative Case open Tamper counts	0.0.96.20.0.255	TPCODL specific
36	Cumulative Temperature Rise counts	0.0.96.50.2.255	TPCODL specific
S. No.	**Billing Profile**	**OBIS Code**	**OBIS Source**
	Billing Profile	1.0.98.1.0.255	IS 15959 part-2
1	Billing Date	0.0.0.1.2.255	IS 15959 part-2
2	Average power factor for billing period	1.0.13.0.0.255	IS 15959 part-2
3	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-2
4	Cumulative Energy kWh TZ1 Import/forwarded	1.0.1.8.1.255	IS 15959 part-2
5	Cumulative Energy kWh TZ2 Import/forwarded	1.0.1.8.2.255	IS 15959 part-2
6	Cumulative Energy kWh TZ3 Import/forwarded	1.0.1.8.3.255	IS 15959 part-2
7	Cumulative Energy kWh TZ4 Import/forwarded	1.0.1.8.4.255	IS 15959 part-2
8	Cumulative Energy kWh TZ5 Import/forwarded	1.0.1.8.5.255	Extra parameter given as 8 rates are supported
9	Cumulative Energy kWh TZ6 Import/forwarded	1.0.1.8.6.255	Extra parameter given as 8 rates are supported
10	Cumulative Energy kWh TZ7 Import/forwarded	1.0.1.8.7.255	Extra parameter given as 8 rates are supported
11	Cumulative Energy kWh TZ8 Import/forwarded	1.0.1.8.8.255	Extra parameter given as 8 rates are supported
12	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS 15959 part-2
13	Cumulative Energy kVAh TZ1 Import/forwarded	1.0.9.8.1.255	IS 15959 part-2
14	Cumulative Energy kVAh TZ2 Import/forwarded	1.0.9.8.2.255	IS 15959 part-2
15	Cumulative Energy kVAh TZ3 Import/forwarded	1.0.9.8.3.255	IS 15959 part-2
16	Cumulative Energy kVAh TZ4 Import/forwarded	1.0.9.8.4.255	IS 15959 part-2
17	Cumulative Energy kVAh TZ5 Import/forwarded	1.0.9.8.5.255	Extra parameter given as 8 rates are supported
18	Cumulative Energy kVAh TZ6 Import/forwarded	1.0.9.8.6.255	Extra parameter given as 8 rates are supported
19	Cumulative Energy kVAh TZ7 Import/forwarded	1.0.9.8.7.255	Extra parameter given as 8 rates are supported
20	Cumulative Energy kVAh TZ8 Import/forwarded	1.0.9.8.8.255	Extra parameter given as 8 rates are supported
21	Maximum Demand KW Import/forwarded	1.0.1.6.0.255	IS 15959 part-2
22	Maximum Demand KVA Import/forwarded	1.0.9.6.0.255	IS 15959 part-2
23	Billing Power On duration in Minutes	0.0.94.91.13.255	IS 15959 part-2
24	Cumulative Energy KWh Export	1.0.2.8.0.255	IS 15959 part-2
25	Cumulative Energy KVAh Export	1.0.10.8.0.255	IS 15959 part-2

26	Maximum Demand KW TZ1 Import/forwarded	1.0.1.6.1.255	IS 15959
27	Maximum Demand KW TZ2 Import/forwarded	1.0.1.6.2.255	IS 15959
28	Maximum Demand KW TZ3 Import/forwarded	1.0.1.6.3.255	IS 15959
29	Maximum Demand KW TZ4 Import/forwarded	1.0.1.6.4.255	IS 15959
30	Maximum Demand KW TZ5 Import/forwarded	1.0.1.6.5.255	Extra parameter given as 8 rates are supported
31	Maximum Demand KW TZ6 Import/forwarded	1.0.1.6.6.255	Extra parameter given as 8 rates are supported
32	Maximum Demand KW TZ7 Import/forwarded	1.0.1.6.7.255	Extra parameter given as 8 rates are supported
33	Maximum Demand KW TZ8 Import/forwarded	1.0.1.6.8.255	Extra parameter given as 8 rates are supported
34	Maximum Demand KVA TZ1 Import/forwarded	1.0.9.6.1.255	IS 15959
35	Maximum Demand KVA TZ2 Import/forwarded	1.0.9.6.2.255	IS 15959
36	Maximum Demand KVA TZ3 Import/forwarded	1.0.9.6.3.255	IS 15959
37	Maximum Demand KVA TZ4 Import/forwarded	1.0.9.6.4.255	IS 15959
38	Maximum Demand KVA TZ5 Import/forwarded	1.0.9.6.5.255	Extra parameter given as 8 rates are supported
39	Maximum Demand KVA TZ6 Import/forwarded	1.0.9.6.6.255	Extra parameter given as 8 rates are supported
40	Maximum Demand KVA TZ7 Import/forwarded	1.0.9.6.7.255	Extra parameter given as 8 rates are supported
41	Maximum Demand KVA TZ8 Import/forwarded	1.0.9.6.8.255	Extra parameter given as 8 rates are supported
42	Cumulative MD KW Import/forwarded	1.0.1.2.0.255	TPCODL specific
43	Cumulative MD KVA Import/forwarded	1.0.9.2.0.255	TPCODL specific
44	Cumulative Tamper count	0.0.94.91.0.255	IS 15959 part-2
45	Cumulative Billing count	0.0.0.1.0.255	IS 15959 part-2
46	Type of billing	1.0.96.50.2.255	TPCODL specific
S. No.	**Block Load Profile**	**OBIS Code**	**OBIS Source**
	Block Load Profile	1.0.99.1.0.255	IS 15959 part-2
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Average Voltage	1.0.12.27.0.255	IS 15959 part-2
3	Block Energy KWh Import/forwarded	1.0.1.29.0.255	IS 15959 part-2
4	Block Energy KVAh Import/forwarded	1.0.9.29.0.255	IS 15959 part-2
5	Block Energy KWh Export	1.0.2.29.0.255	IS 15959 part-2
6	Block Energy KVAh Export	1.0.10.29.0.255	IS 15959 part-2
7	Average Current	1.0.11.27.0.255	IS 15959 part-2

Note: Block Load Profile parameters are required to be field programable, a TPCODL specific OBIS code will be used for this purpose and on changing capture objects LS data will be reset.			
S. No.	**Daily Survey Profile**	**OBIS Code**	**OBIS Source**
	Daily Survey Profile	1.0.99.2.0.255	IS 15959 part-2
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Cumulative Energy KWh Export	1.0.2.8.0.255	IS 15959 part-2
3	Cumulative Energy KVAh Export	1.0.10.8.0.255	IS 15959 part-2
4	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-2
5	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS 15959 part-2
6	Maximum Demand KW Import/forwarded	1.0.1.6.0.255	IS 15959 part-2
7	Maximum Demand KVA Import/forwarded	1.0.9.6.0.255	IS 15959 part-2
S. No.	**Name Plate Profile**	**OBIS Code**	**OBIS Source**
	Name Plate Profile	0.0.94.91.10.255	IS 15959 part-2
1	Meter Serial Number	0.0.96.1.0.255	IS 15959 part-2
2	Device ID	0.0.96.1.2.255	IS 15959 part-2
3	Manufacturer Name	0.0.96.1.1.255	IS 15959 part-2
4	Firmware Version for meter	1.0.0.2.0.255	IS 15959 part-2
5	Meter Type	0.0.94.91.9.255	IS 15959 part-2
6	Category	0.0.94.91.11.255	IS 15959 part-2
7	Current rating	0.0.94.91.12.255	IS 15959 part-2
8	Meter Year of Manufacture	0.0.96.1.4.255	IS 15959 part-2
S. No.	**Profile for Voltage events**	**OBIS Code**	**OBIS Source**
	Voltage event Profile	0.0.99.98.0.255	IS 15959 part-2
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Event Code (voltage events)	0.0.96.11.0.255	IS 15959 part-2
3	Event Snap Current	1.0.94.91.14.255	IS 15959 part-2
4	Voltage	1.0.12.7.0.255	IS 15959 part-2
5	Signed power factor	1.0.13.7.0.255	IS 15959 part-2
6	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-2
7	Cumulative Tamper count	0.0.94.91.0.255	IS 15959 part-2
8	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS 15959 part-2
S. No.	**Profile for Current events**	**OBIS Code**	**OBIS Source**
	Current event Profile	0.0.99.98.1.255	IS 15959 part-2
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2

2	Event Code (current events)	0.0.96.11.1.255	IS 15959 part-2
3	Event Snap Current	1.0.94.91.14.255	IS 15959 part-2
4	Voltage	1.0.12.7.0.255	IS 15959 part-2
5	Signed power factor	1.0.13.7.0.255	IS 15959 part-2
6	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-2
7	Cumulative Tamper count	0.0.94.91.0.255	IS 15959 part-2
8	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS 15959 part-2
S. No.	**Profile for Other events**	**OBIS Code**	**OBIS Source**
	Other event Profile	0.0.99.98.4.255	IS 15959 part-2
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Event Code (other events)	0.0.96.11.4.255	IS 15959 part-2
3	Event Snap Current	1.0.94.91.14.255	IS 15959 part-2
4	Voltage	1.0.12.7.0.255	IS 15959 part-2
5	Signed power factor	1.0.13.7.0.255	IS 15959 part-2
6	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-2
7	Cumulative Tamper count	0.0.94.91.0.255	IS 15959 part-2
8	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS 15959 part-2
S. No.	**Profile for Power Fail events**	**OBIS Code**	**OBIS Source**
	Power Fail event profile	0.0.99.98.2.255	IS 15959 part-2
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Event Code (power fail events)	0.0.96.11.2.255	IS 15959 part-2
S. No.	**Profile for Transaction events**	**OBIS Code**	**OBIS Source**
	Transaction event Profile	0.0.99.98.3.255	IS 15959 part-2
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Event Code (transaction events)	0.0.96.11.3.255	IS 15959 part-2
S. No.	**Profile for Non Rollover events**	**OBIS Code**	**OBIS Source**
	Non Rollover event profile	0.0.99.98.5.255	IS 15959 part-2
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Event Code (non-rollover events)	0.0.96.11.5.255	IS 15959 part-2
S. No.	**Profile for Control events compartments**	**OBIS Code**	**OBIS Source**
	Control event Profile	0.0.99.98.6.255	IS 15959 part-2
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Event Code (control events)	0.0.96.11.6.255	IS 15959 part-2

S. No.	Profile for TPCODL specific events compartments	OBIS Code	OBIS Source
	TPCODL specific events compartments profile	0.0.99.98.128.255	TPCODL specific
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Event Code (TPCODL specific events compartment	0.0.96.11.128.255	TPCODL specific
3	Event Snap Current	1.0.94.91.14.255	IS 15959 part-2
4	Voltage	1.0.12.7.0.255	IS 15959 part-2
5	Signed power factor	1.0.13.7.0.255	IS 15959 part-2
6	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-2
7	Cumulative Tamper count	0.0.94.91.0.255	IS 15959 part-2
8	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS 15959 part-2
9	Temperature	0.0.96.9.128.255	TPCODL specific
S. No.	**Event Push Profile**	**OBIS Code**	**OBIS Source**
1	Device ID	0.0.96.1.2.255	IS 15959 part-2
2	Event Push SM to HES	0.4.25.9.0.255	IS 15959 part-2
3	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
4	Event Status Word 1	0.0.94.91.18.255	IS 15959 part-2
S. No.	**Programmable Parameters**	**OBIS Code**	**OBIS Source**
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Demand Integration Period	1.0.0.8.0.255	IS 15959 part-2
3	Survey Integration Period / Profile Capture Period	1.0.0.8.4.255	IS 15959 part-2
4	Single-action Schedule for Billing dates	0.0.15.0.0.255	IS 15959 part-2
5	Activity Calendar for Time Zones	0.0.13.0.0.255	IS 15959 part-2
6	Image Transfer	0.0.44.0.0.255	IS 15959 part-2
7	Load Limit in KW	0.0.17.0.0.255	IS 15959 part-2
8	Connect/disconnect	0.0.96.3.10.255	IS 15959 part-2
9	Metering Mode	0.0.94.96.19.255	IS 15959 part-2 Amendment 1
10	Payment Mode	0.0.94.96.20.255	IS 15959 part-2 Amendment 1
11	Last token recharge amount	0.0.94.96.21.255	IS 15959 part-2 Amendment 1
12	Last token recharge time	0.0.94.96.22.255	IS 15959 part-2 Amendment 1
13	Total amount at last recharge	0.0.94.96.23.255	IS 15959 part-2 Amendment 1
14	Current balance amount	0.0.94.96.24.255	IS 15959 part-2 Amendment 1
15	Current balance time	0.0.94.96.25.255	IS 15959 part-2 Amendment 1
16	Current Association MR (LLS secret change)	0.0.40.0.2.255	IS 15959 part-2 Amendment 1
17	Current Association US (HLS Key change)	0.0.40.0.3.255	IS 15959 part-2 Amendment 1
18	Current Association FW (HLS Key change)	0.0.40.0.5.255	IS 15959 part-2 Amendment 1
19	Global Key (encryption and authentication)	0.0.43.0.e.255 (e = 2, 3, 4, 5)	IS 15959 part-2 Amendment 1

20	Image Activation Single Action Schedule	0.0.15.0.2.255	IS 15959 part-2 Amendment 1
21	Event Status Word Filter	0.0.94.91.26.255	IS 15959 part-2 Amendment 1
22	MD Reset	0.0.10.0.1.255	IS 15959 part-2 Amendment 1
23	Over Voltage Event Threshold Configuration	1.0.12.129.129.255	TPCODL specific
24	Low Voltage Event Threshold Configuration	1.0.12.129.130.255	TPCODL specific
25	Over Current Event Threshold Configuration	1.0.11.129.132.255	TPCODL specific
26	Over Voltage Event Persistence time Configuration	1.0.12.130.129.255	TPCODL specific
27	Low Voltage Event Persistence time Configuration	1.0.12.130.130.255	TPCODL specific
28	Over Current Event Persistence time Configuration	1.0.11.130.132.255	TPCODL specific
29	Over Load Event Persistence time Configuration	1.0.1.130.128.255	TPCODL specific
30	Display Parameters Auto Scroll	0.0.96.128.0.255	TPCODL specific
31	Display Parameters Push Button	0.0.96.128.1.255	TPCODL specific
32	Display Parameters HR mode	0.0.96.128.2.255	TPCODL specific
33	Load Profile capture Objects	1.0.96.128.2.255	TPCODL specific
34	Temperature Rise Threshold Configuration	0.0.96.128.3.255	TPCODL specific
35	Temperature Rise Persistence time Configuration	0.0.96.128.6.255	TPCODL specific
38	Current Mis-match Event Threshold Configuration	1.0.11.129.133.255	TPCODL specific
39	Current Mis-match Event Persistence time Configuration	1.0.11.130.133.255	TPCODL specific
40	Event Enable/Disable Configuration	0.0.96.128.7.255	TPCODL specific
41	Load Control Parameters	0.0.96.3.128.255	TPCODL specific
S. No.	**Mode of operation of load switch profile**	**OBIS Code**	**OBIS Source**
	Mode of operation of load switch profile	0.0.99.98.129.255	TPCODL specific
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Event Code (Control events)	0.0.96.11.6.255	IS 15959 part-2
3	Reason for Switch operation	0.0.96.50.4.255	TPCODL specific
4	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-2
5	Cumulative Energy kWh TZ1 Import/forwarded	1.0.1.8.1.255	IS 15959 part-2
6	Cumulative Energy kWh TZ2 Import/forwarded	1.0.1.8.2.255	IS 15959 part-2
7	Cumulative Energy kWh TZ3 Import/forwarded	1.0.1.8.3.255	IS 15959 part-2
8	Cumulative Energy kWh TZ4 Import/forwarded	1.0.1.8.4.255	IS 15959 part-2
9	Cumulative Energy kWh TZ5 Import/forwarded	1.0.1.8.5.255	Extra parameter given as 8 rates are supported
10	Cumulative Energy kWh TZ6 Import/forwarded	1.0.1.8.6.255	Extra parameter given as 8 rates are supported
11	Cumulative Energy kWh TZ7 Import/forwarded	1.0.1.8.7.255	Extra parameter given as 8 rates are supported
12	Cumulative Energy kWh TZ8 Import/forwarded	1.0.1.8.8.255	Extra parameter given as 8 rates are supported

S. No.	**Accuracy Check Data Profile**	**OBIS Code**	**OBIS Source**
	Accuracy Check data Profile	1.0.99.128.129.255	TPCODL specific
1	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS15959-Part2
2	Cumulative Energy KWh Export	1.0.2.8.0.255	IS15959-Part2
3	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS15959-Part2
4	Cumulative Energy KVAh Export	1.0.10.8.0.255	IS15959-Part2

ANNEXURE-II

PART-A/ LOT-2

TECHNICAL SPECIFICATION FOR

TWO YEAR RATE CONTRACT FOR

SUPPLY OF

THREE PHASE WHOLE CURRENT SMART ENERGY METER

UNDER SMART METERING PROJECT

Tender Enquiry No.

TPCODL/ P&S/ 167 (Part-A/ Lot-2)/ 2020-21

CONTENTS

1	**SCOPE**	This specification covers the technical requirements of design, manufacturing, testing & integration with network integration card(NIC) of 4G communication being used at TATA POWER CENTRAL ODISHA DISTRIBUTION LIMITED at meter manufacturer's works, packing, forwarding, supply and unloading at store/site of three phase four wire,3x230 voltage,20-100A, whole current static smart energy meters of accuracy class 1.0 (here after referred as meters) complete with all accessories for efficient and trouble free operation with communication module (NIC) compatible with 4G and fall back to 2G technology along with meter box... It is not the intent to specify completely herein all the details of tech design and construction of material. However, the material shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in manner acceptable to the TPCODL, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered material shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.
2	**APPLICABLE STANDARDS**	The equipment covered by this specification shall conform to the requirements stated in latest editions & amendments of relevant Indian/ IEC Standards and shall conform to the regulations of local statutory authorities.

a	IS 16444 Part-1 : 2015	A.C. Static Direct connected Watt hour Smart meter class 1.0 and 2.0
b	IS 13779 : 1999	A.C. Static Watt hour meter class 1.0 and 2.0
c	IS 15884 : 2010	A.C. direct connected static prepayment meters for active energy (class 1 & 2)
d	IS 15959 Part 1 : 2011	Data exchange for electricity meter reading, tariff and load control
e	IS 15959 Part 2 : 2016	Data exchange for electricity meter reading , tariff and load control
f	IEEE 802.15.4 : 2003	Standard for local and metropolitan area networks
g	IS 9000	Basic Environmental testing procedure for electrical and electronic items.
h	IEC 62052-11 : 2003	Electricity Requirements (AC) General Requirements Tests and Test conditions for A.C.Static Watt hour meter for active energy Class 1.0 and 2.0.
i	IEC 62053-21 : 2003	A.C.Static Watt hour meter for active energy Class 1.0 and 2.0
j	IS 15707 : 2006	Testing Evaluation installation and maintenance of AC Electricity Meters- Code of practice.
k	IEC 60068	Environmental testing.

		l	CBIP–TR No.325	Specification for A.C. Static Electrical Energy Meters (latest amendment)
		m	CEA Regulation (2006)	Installation and operation of meters Dtd: 17/03/2006.
		n	IS 12346:1999	Testing Equipment For Ac Electrical Energy Meters
		o	IS 11000	Fire Hazard Testing
		p	IS 60529	Degree of protection provided by enclosure

3 CLIMATE CONDITIONS OF THE INSTALLATION

a) Max. Ambient Temperature : 50 deg.C
b) Max. Daily average ambient temp. : 40 deg.C
c) Min Ambient Temp : 0 deg C
d) Maximum Humidity : 95%
e) Minimum Humidity : 10%
f) Average No. of thunderstorm days per annum : 50
g) Maximum Annual Rainfall : 750 mm
h) Average No. of rainy days per annum : 60
i) Rainy months : June to Oct.
j) Altitude above MSL not exceeding : 300 meters
k) Wind Pressure : 126 kg/sq m up to an elevation at 10 m.

The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.3 g.

4 GENERAL TECHNICAL REQUIREMNTS

S.No.	DESCRIPTION	REQUIREMENT
4.01	Type of the meter	Three phase four wire, static watt-hour direct connected type smart meter without application of any multiplication constant. It consisting of measuring elements(s),time of use of register(s),display, load switch and plug in type bi-directional communication module all integral within the meter housing.
4.02	Accuracy Class of the meter	1.0
4.03	Basic Current (Ib) & rated Maximum current (Imax)	Ib= 20A; Imax= 100 Amps (Meter shall be able to continuously carry 120% of Imax Meeting the accuracy requirements)
4.04	Reference Conditions for testing the performance of the meter	Vref = 230V Frequency = 50Hz Temperature= 27^0C
4.05	Operating Voltage	Meter shall be operational with required accuracy from 0.6 Vref to 1.2 Vref. However meter shall withstand the maximum system Voltage of 440V (for minimum 5 min).

		4.06	Operating Frequency	50 Hz± 5%.
		4.07	Power Consumption	Voltage circuit: Maximum 5.0 W and 15 VA Current Circuit :Maximum 4VA (The additional power requirement during data transmission shall not exceed 7W/as mentioned in IS 16444 whichever is lower, per communication module)
		4.08	Starting Current	40mA (0.2% of Ib) (phase current)
		4.09	Short time over Current	3000 A for 0.01 sec (30Imax for one half cycle at Rated frequency)
		4.10	Influence of heating	Temperature rise at any point of the external surface of the meter shall not exceed by more than 20^0 C with an ambient temperature at 50^0 C.
		4.11	Rated Impulse withstand voltage	6KV (shall be applied ten times with one polarity and then repeated with the other polarity.)
		4.12	AC withstand Voltage for 1 min	4 KV
		4.13	Minimum Insulation resistance at test voltage 500+/- 50 V dc a)Between frame & current ,voltage circuits as well as auxiliary circuits connected together: b)Between each current (or voltage circuit) & each and every other circuit. :	a) 5 M ohm b) 50 M ohm.
		4.14	Mechanical requirements	Meter shall be in compliance with clause 12.3 of IS 13779
		4.15	Resistance to heat and fire	The terminal block and Meter case shall ensure safetyagainst the spread of fire. They shall not be ignitedby thermal overload of live parts in contact with them as per clause 6.8 of IS 13779. Fire retardant material shall be used.
		4.16	Protection against penetration of dust and water.	Degree of protection :IP 51 as per IS 12063/60529, but Without suction in the meter. Meter shall comply with clause 6.9 and 12.5 of IS 13779
		4.17	Resistance against Climatic influence.	Meter shall be in compliance with clause 12.6 of IS 13779.
		4.18	Electromagnetic Compatibility (EMC)	Meter shall be in compliance with clause 4.5 & 5.5 of IS 15884.

		4.19	Accuracy requirements	Meter shall be in compliance with clause 11 of IS 13779.
		4.20	Power factor range	Zero lag to Zero lead. & meter shall be programed at default lag only configuration i.e. Lead to be treated as unity for kVA&kVAh calculations
		4.21	Energy measurement	Fundamental energy +Energy due to Harmonics
		4.22	Connection Diagram	The connection diagram for the system shall be provided on terminal cover.
		4.23	Self Diagnostic feature	The meter shall have indications for un satisfactory / non-functioning of (i) Real Time Clock (ii) RTC battery (iii) Non Volatile Memory (iv) NIC card
		4.24	Initial start up of meter	Meter shall be fully functional within 5 sec after reference voltage is applied to the meter terminals.
		4.25	Alternate mode of supply to the meters	In case of meter power failure , reading/data should be retrieved with the help of battery or other power source.
		4.26	Sleep Mode	Meter shall not go in sleep mode. Display should not be 'off' at any point of time when power up.
		4.27	Internal diameter of the terminal holes Depth of the terminal holes	9.5mm (minimum) 20 mm (minimum)
		4.28	Clearance between adjacent terminals	10 mm (minimum)
		4.29	Display	Backlit LCD, Scrolling, 10 seconds for each parameter. minimum 8 digits LCD display
		4.30	Security feature	Programmable facility to restrict the access to the information recorded at different security level such as read communication, write communication ,firmware selection from remote etc.
		4.31	Software and communication compatibility	The bidder shall supply software required for local (MRI – conventional/4G) & remote (AMI) connectivity including required training to use the software free of cost.
		4.32	Calibration	Meters shall be software calibrated at factory and modifications in calibration shall not be possible at site by any means. However parameters like RTC,TOD slots, DIP(billing & load survey), billing date, display parameters etc. shall be reconfigure through MRI and remotely over the air (OTA)

		4.33	Communication module of meter for AMI	As per clause no 1.2 (b) of IS 16444. Meter should have provision of communication module compatible with both the variant mentioned in IS 16444. This module should be able to get connected to the NAN / WAN network of service provider (4G) of TPCODL. Meter should be able to provide required power supply to NIC card provided by communication provider recommended by TPCODL. Size /form factor of NIC card will be provided by TPCODL to the bidder and bidder should make necessary arrangement for the same.
		4.34	Communication Layer Protocol	Should be as per clause 9.3 of IS 16444
		4.35	Key Management and Security Feature	Should be as per IS 15959
		4.36	Harmonics recording	The meter should record the current and voltage THD. The meter should record harmonics up to 20th harmonic Average THD of all phase for voltage THD and current THD. THD values shall have 30 minutes integration period in load survey. Accuracy of harmonics recording shall be as per meter accuracy class. The meter shall generate a flag whenever the threshold (user configurable) of the 5% THD of the load current and voltage is breached.
		4.37	Usage Application	Indoor and Outdoor
		4.38	Ultrasonic welding / Chemical Bonding	Meter cover and body should be ultrasonically weldedor should be seamlessly chemically bonded, so that meter should not open without leaving clear mark.

4.1 DISCONNECTOR

The meter shall have the facility of disconnecting and re-connecting the load of the meter from the remote and by authenticated command through Laptop/HHU at site by means of a built-in contactor. This operation shall be conducted with the help of a third party software which is owned by us and in addition to the manufacturer's own software,. Each operation of the switches shall be logged by the meter as an event with date and time stamp and reading parameters. This operation should be in line with clause 11 of IS 16444, however should be disabled by default. Meter should display reason for disconnection in meter display and IHD (if available). The cumulative number of ON/OFF operations shall also be made available.

Switch shall be in compliance to IS 15884.The make of the load switch should be of reputed make like Grooner (German) or equivalent and same shall be confirmed by the bidder during tendering. The brief technical particulars of this Disconnector/load switch are furnished below:-

S.No.	DESCRIPTION	REQUIREMENT
1	Operating Voltage range	130 V to 470 V
2	Operating Current range	20 mA to 120 A
3	Maximum switching power	22 kVA per phase/ per IS 15884 Annex G
4	No. of poles	3 nos (one in each R,Y,B phases)
5	Operation of switches	Simultaneous
6	Utilization Categories	UC2 or better
7	Min. Number of operation	3000 (close, open each)

4.2 NIC MODULE DETAILS & INTEGRATION

With the service providers offering 4G services, TPCODL intends to leverage 4G as the primary communication technology with hot swappable 2G Interface Card as a fall back for meter data acquisition.

a) The Network Interface Card for 4G shall be modular and pluggable. The NIC shall be interoperable for service provider
b) NIC card shall support remote Device Management Capability such as Reset, Configuration, Log Check, Ping, and over the air Firmware upgrade
c) NIC shall support two-way communications between smart meter & head-end system such as data exchange, configuration parameters exchange, alarms, operational commands, firmware upgrade of the meter as defined in IS16444and IS15959.
d) NIC shall support push services, alarms services of the smart meter as defined in IS16444 and IS15959.
e) 4G NIC card shall support communication protocols as prescribed by 4G HES supplier.
f) NIC shall also support on-demand / schedule reading, connect / disconnect, time sync, configuration and over the air firmware upgrade from the head-end system.
g) NIC shall have persistent network connectivity throughout as defined by 4Gand

		NBIoT standards. It shall support self-configuring and self-healing features. h) NIC shall operate 24*7 and shall recover from any deadlock situation immediately in the field. i) Support for possibility for provision of a unique certificate/key in each card for mutual authentication with the HES from security point of view. j) NIC shall support standard security protocols. k) NIC shall be compliant with cyber security norms. l) NIC shall register with network i.e. login and logout of each terminal to the HES. It shall be recognized in the HESas authorized node. m) Attributes such as Firmware version, Hardware version, Signal strength values, packet error rate, should be pushed periodically to HES for effective communication management. n) Data must be encrypted with AES-256 bit. o) LED indication for System, Power ON indicator. p) Colour coded LED (a) For latching on to the network (b) For latched on to the network (c) For data flow indication. q) Meter display should have provision for showing if NIC card if : 1. Installed, 2. Getting Network, 3. Latched with HES, 4. Communicating with HES
4.3	**Communication capabilities and software feasibilities**	4.3.1 The meter shall have facilities for data transfer locally through Meter Reading Instrument (MRI) (Using optical port/NIC card) and remotely by 4G with proper security via Plug in type NIC. Data transfer locally through optical port via MRI is desired along with data transfer through NIC card. The data downloaded in MRI/hand held device shall be integrated to HES data base. 4.3.2 It should be the responsibility of the bidder to ensure integration of meter into HES. For cellular fallback, the Module should have backward compatibility. The fall back provision shall be taken through optical port with external modem by TPCODL. Meter should be capable for sending all data from 4G NIC and optical port. 4.3.3 It shall be possible to reconfigure the meters for RTC,TOD slots reprogramming, DIP (Demand Integration period), billing date ,display parameters etc. through proper authentication process locally through MRI and remotely over the air (OTA). Meter data should remain intact with timings. And billing should be done whenever any above mentioned attribute is changed. The change should be recorded as upgrade event. 4.3.4 Necessary keys if required for performing this reconfiguration operation should also be provided along with supply of meter lot & training to TPCODL staff on how to use it free of cost. Bidder to provide this support on a later stage also on the request of TPCODL without any cost implication. 4.3.5 Optical Communication port shall be available for communication. Communication ports shall not be affected by any type of injection /unauthenticated signals and having proper sealing arrangement. The complete data shall be downloaded within 5 minutes OTA. 4.3.6 Bidder to ensure integration of meter data with head end for data transfer as mentioned in specification. TPCODL reserves the right that if required, TPCODL will hand over the SIM cards to OEM and supply will be accepted with SIM cards already installed and with communication already tested in 100 % meters. For

		this purpose, TPCODL HES will be used for confirming data availability. 4.3.7 Meter should be supplied to TPCODL along with integrated NIC card. NIC card should be plug in type with proper sealing arrangement. 4.3.8 The bidder shall supply software required for local (MRI) & remote (AMI) connectivity including required training to use the software free of cost. Bidder shall provide the communication protocol / APIs for communication with meter through local (MRI) / remote (AMI) as and when required by TPCODL free of cost during life time of meter. The bidder should provide DLMS compliance for Communication with the meter at Optical port and at HES. 4.3.9 Bidder should also provide software for changing/upgrading meter firmware in mass and should support integration of this software with HES. Bidder should also provide base computer software (BCS) for viewing the data downloaded through HES/MRI/laptop/HHU in separate PC/laptop. Android based or windows based HHU shall be preferred. 4.3.10 For purpose of exercising control, like outage management, the meter should send abnormalities at the consumers' end like Power failure (Last Gasp) instantly, Power Restoration (First Breath) as event. Additional exceptional events should also be communicated to HES by meter immediately after the occurrence through RF / RF Mesh. It should also indicate the restoration of the same event. 4.3.11 List of events to be reported should be configurable over the air(OTA).The meter should have "Last Gasp" and “First Breath” feature to facilitate sending alerts to the HES during fully powered off / On condition. 4.3.12 If there are 2 requests given for communication one from HES and other from local device, request from local device should supersede. 4.3.13 Last mile mesh network must support auto-registration and self-healing feature to continue operation using easiest possible available route in case of failure of any communication device in the mesh. Self-registrations in first communication. 4.3.14 Meter Serial no will be used for tagging of all data of the meters in all database (at HES / MDM/ DCU level etc). However, it will be the responsibility of the Bidder to establish the complete communication solution involving all the meters in the system. Also, the Bidder must ensure that, the mode of communication used for RF shall be consistent with the Government of India stipulations. Bidder should come out with it requirements for integration of meter with HES and MDMS clearly during tender submission. 4.3.15 The Bidder's supplied meter with third party communication module should have suitable hand-shaking features to allow a third-party MDMS(procured by TPCODL) to configure, command, read and control smart meters installed at site. The Bidder shall extend all necessary assistance in developing the adaptor software through a third-party for facilitating the above. 4.3.16 Integration of meter software’s with HES / MDMS for seamless transfer of data will also be in scope of bidder till the expiry of warranty of the meters. It is desired meter firmware up gradation/selection should be available over the air.

		Meter should be able to change to prepaid mode if required with firmware upgrade. The required firmware and any required support for integration with HES shall be provided free of cost till the useful life of the meter. 4.3.17 Communication of the meter at optical port /OTA (NAN/WAN) should be as per IS 15959 (Part-2):2016. The optical port should be with proper lockable mechanism 4.3.18 Communication NIC/network should be immune with any external Magnetic field/ESD/Jammer/HV voltage influence such that it shall not affect the normal overall functionality. 4.3.19 Meter once powered up with NIC card should be self-detected by RF network and its basic name plate details & current readings are transferred to HES. 4.3.20 The required OBIS codes will be finalized with successful bidder. The bidder can offer desired codes from Blue Book ensuing the codes reserved or standardized by Bureau of Indian standards. The reserved codes in BIS are to be used/utilized as per guidelines of BIS and remaining codes from blue book can be used for communication of additional features mentioned in this specifications. This is to be done strictly with written approval from TPCODLafter verification of proposed codes by manufacturer. In future if BIS adds any OBIS codes then the bidders to provide upgraded firmware with desired changes after in consultation and approval of TPCODLcompetent authority. 4.3.21 Meter display should have provision for showing if NIC card if : 1. Installed, 2. Getting Network, 3. Latched with HES, 4. Communicating with HES 4.3.22 If any tamper occurs in power off situation, it should be pushed as soon as the meter is powered on. 4.3.23 Bidder to provide facility for Up-gradation / Modification of Firmware 4.3.24 Following parameters may be updated multiple times during life cycle of meters over the air : Post Paid to Prepaid mode and vice versa Import mode to export Mode and vice versa. Accordingly Display parameters shall be updated remotely.
4.4	**Immunity against external influencing signals**	**4.4.1 Magnetic Field:** Meter shall record accurate energy in case of any external influencing signals in line with IS 13779:1999 Cl.11.2 and variation in limits of error (upto 100% Imax) shall be as per the table 17 of IS 13779. Meter shall be immune to magnetic field such that it shall not affect the normal overall functionality However, in case of abnormal magnetic field as defined below meter shall perform as per the following actions: a) Meter shall log the event in its memory as" Magnet" with date and time stamp, the event logging threshold values as per table no. 1 in 4.55 b) The energy recording to shift on I max, Vref. with UPF. **Abnormal Magnetic field is defined as below;** a) Continuous DC magnetic induction: **>**0.20 Tesla ± 5% (Value of the magneto motive force to be applied shall be generally >10000 AT.

		b) AC magnetic induction: >10 milli Tesla (if produced with circular metal core with square cross section as specified in CBIP latest report with 2800 AT) **c)** Permanent Magnet: Immune up to 0.5T and Event logging >0.5T. **4.4.2 Electrostatic Discharge (ESD)** Meter shall be immune up to 50 kV and shall record accurate energy as per IS-13779:1999/CBIP-325. Meter shall log the event into memory as ' ESD' with date & time stamp for any ESD greater than 50 kVwith snap shot, the event loggingthreshold values as per table no. 1 in 4.6 4.4.3 The shielding around the meter shall be such that it does not get affected by high Voltage and high energy or low energy impulse when comes in contact with meter from any side. 4.4.4 Meter should immune to high/low frequency jammer devices. Meter shall log the event in its memory as" JAMMER" with date and time stamp, the threshold values as per table no. 1 in 4.6. 4.4.5 The meter should be immune or log the tamper on application of any other higher magnetic field of any frequency waves, micro waves like magnetron etc. the threshold values as per table no. 1 in 4.6.
4.5	**Neutral Disturbance & other tampers**	4.5.1 The meter shall not saturate on passage of direct current, which can cause the meter either to stop recording/ record inaccurately. DC injection shall be tested both in phase and neutral. Measurement by meter shall not get influenced by injection of Chopped signal/ DC signal/ DC pulse upto 330V and for any value beyond this. Meter shall log the event into memory as 'Neutral Disturbance' with date & time stamp the thresholds are as per table no. 1 in 4.6 4.5.2 The meter should log event as 'High Neutral current' with snapshot when all three phase currents are zero and neutral current is present.
4.6	**Abnormal and Tamper conditions**	4.6.1 The meter shall record forward energy under all abnormal tampering conditions and shall be capable of recording occurrence and restoration of abnormal events listed below along with date & time and snap shots of individual voltages, currents, power factors, active energy and apparent energy at the time of occurrence of abnormal event and restoration of normal supply. 4.6.2 For all tamper events the time stamp and snapshot parameters shall be recorded at the start time of event for occurrence (T1) and for restoration the time stamp and snapshot parameters shall be recorded at the end time of the event (T3). 4.6.3 During abnormal & tamper conditions, the current shall be recorded as active current and line current. Each such event shall be provided with minimum count of as per table no.1 to avoid missing of data amidst usual events (like power failure) due to the limitation of FIFO. Persistence time for occurrence and

restoration for the events along with their threshold values shall be as per table no. 1 given below.

4.6.4 The events for which the restoration not occurred those should not be removed from meter memory and FIFO should not be applicable for unrestored event.

4.6.5 Tamper event logging along with snapshot during occurrences & restorations shall be as per table no.1. The smart meters manufacturing samples should start recording the abnormal influencing signals as defined in the specifications.

4.6.6 All tamper/event logging thresholds values shall be configurable from remotes.

4.6.7 On request Meter should be able to provide historic data also.

4.6.8

Table No.1

Persistence Time for Occurrences	Persistence Time for Restoration	Threshold Value for Occurrence of Events	Threshold Value for Restoration of Events	Compartment Size
ESD/JAMMER=immediate (record only 1 event on first application & only one event for next 1min) (ESD)	ESD/JAMMER = 0 Hr 01 Min 0 sec (ESD) (should restore after 1 min. of last application)	Immunity up to 50 KV with NIC and logging of event>50 KV	Removal of ESD/JAMMER signal	25
Magnet = 0 Hr2 Min 0 sec (MAG)	Magnet = 0 Hr 2 Min 0 sec (MAG)	>0.5 Tesla for permanent magnet OR DC magnetic induction >0.2T OR AC magnetic induction > 10 mT (of any frequency)	<0.5 Tesla for permanent magnet OR DC magnetic induction < 0.2T or AC magnetic induction <10 mT	25
Meter Top Cover Open (TC Open) Immediate	Meter Top Cover Open (TC Open) Immediate	If meter top cover is opened	NA	05 (Stay put Type)
Potential Missing = 0 Hr 10 Min 0 sec (PM)	Potential Missing = 0 Hr 2 Min 0 sec	Voltage < 70% of Vref AND current > 2% Ibasic	Voltage > 80% of Vref AND current > 2% Ibasic	25

			Voltage Unbalance = 0 Hr 30 Min 0 sec (VU)	Voltage Unbalance = 0 Hr 2 Min 0 sec	20% or more between the phases and current > 2% Ibasic	Shall be less than 10 % between the phases and current > 2% Ibasic	25
			CT Open (phase wise) = 0 Hr 10 Min 0 sec	CT Open (phase wise) = 0 Hr 2 Min 0 sec	Ir + Iy + Ib + In ≥ 10 % of Ibasic (vector Sum) AND Phase current < 1% of Ibasic with All current positive	Ir + Iy + Ib + In < 5 % of Ibasic. (vector Sum) AND Phase current > 10% of Ibasic with All current positive	25
			CT Reversal = 0 Hr 30 Min 0 sec (CTR)	CT Reversal = 0 Hr 2 Min 0 sec	Active current negative	Active current positive AND > 2 % Ibasic	25
			Current Unbalance = 0 Hr 30 Min 0 sec (CU)	Current Unbalance = 0 Hr 2 Min 0 sec	Current difference ≥30% between phases and I min 10% of Ibasic	Current difference <20% between the phases and I min>5% of Ib	25
			Low Power Factor = 0 Hr 30 Min 0 sec (LPF)	Low Power Factor = 0 Hr 2 Min 0 sec	I >1% of Ib and Power Factor ≤ 0.5 in any phase	I >1% of Ib and Power Factor ≤ 0.7 in respective phase	25
			Neutral Disturbance = 0 Hr 01 Min 0 sec (ND)	Neutral Disturbance = 0 Hr 2 Min 0 sec (ND)	Voltage >145% of Vref&Current >10% Ib OR Frequency < 47 Hz OR Frequency > 53 Hz OR DC voltage / signal/ pulse/ chopped signal injection	Voltage <115% of Vref&Current > 10% Ib AND Frequency > 47 Hz OR Frequency < 53 Hz	25
			Power On Off = 0 Hr 02 Min 0 sec	Power On Off = immediate	Actual Voltage off	Actual Voltage On	25
			Over Voltage = 0 Hr 30 Min 0 sec	Over Voltage = 0 Hr 2 Min 0 sec	Voltage > 130% of Vref	Voltage <110% of Vref	25
			Over current= 0hr 30min 0sec (OL)	Over Current = 0hr 2min 0sec	>Preset value (default value set at 120%Ib)	I<100%Ib	25

Microwave immediate (record only 1 event on first application & only one event for next 1min)	Microwave 0 Hr 01 Min 0 sec (should restore after 1 min. of last application)	Any higher frequency magnetic waves, micro waves > 10 mT (or mutually decided)	Removal of device	25
No Display 0 Hr 30 Min 0 sec	On restoration of display	Energy Meter power up (circuit charged) and display non functioning	Display working	5
Temperature Rise = 0 Hr 30 Min 0 sec (TR)	Temperature Rise = 0 Hr 02 Min 0 sec (TR)	Temperature >70˚C	Temperature <60˚C	25 (Stay put type)
NIC card Removed (Immediate)	NIC Card inserted (Immediate)	On removal of card	On insertion of card	20
PhSeq (Immediate)	PhSeq (Immediate)	Change of phase sequence	Restoration of phase sequence	5
High Neutral Current (HNC) 0 Hr 10 Min 0 sec	High Neutral Current (HNC) 0 Hr 02 Min 0 sec	When phase current are zero & neutral current >10% Ib	neutral current <10% Ib	20

Meter shall be provided with feature for terminal cover opening with time stamping.

Note: “Meter shall have neutral CT for tamper identification and analysis.”

4.6.9 Meter shall latch & store cumulative count and cumulative durations all the tampers events which have logged /occurred/stored in memory of meter from the date of energization till life of meter. Total tamper storage should be as per table 1 above.

4.6.10 The meter shall record in export registers in case of reversal of all CT terminals. The meters are to be used for registration of energy consumed by the consumer, as such the meters shall be programmed for import mode and in case of reversal of energy direction (reversal of all CT terminals) meter shall register energy separately in export mode i.e. in case of CT reversal, meter shall record scalar (not vector sum) sum of energy.

4.6.11 The meter shall register correctly if supply neutral is not available at the meter neutral terminal.

4.6.12 The meter shall work in absence of any two incoming wires.

		4.6.13 It shall keep recording correctly in case of unbalance system voltage also. 4.6.14 The meter shall keep working accurately irrespective of the phase sequence of the supply. The meter shall be functional even if somehow change in the phase sequence takes place. Meter shall sufficiently record this event as reverse sequence. 4.6.15 The Meter Shall be able to differentiate between actual CT reversal and condition arising out of unbalanced / unhealthy capacitor bank. The logics for the same to be provided in tender samples also. 4.6.16 The Cover Open tamper detection should be through heavy duty, sturdy two number micro switcheswith OR gate logic such that it should not log false event on vibration or impact during handling or testing.
4.7	**Event compartments**	4.7.1 The event compartments shall be IS 15959 Part-1 table 9. 4.7.2 The size of the event compartments should be such that all above events (in table no.1 and other required events defined in various clauses of this documents) are accommodated in the assigned event category compartment. i.e. if in case of voltage compartment assigned to 4 number of events then the minimum size of this compartment should be such that it should accommodate sum of all maximum number of events as marked above table 1 . 4.7.3 Transaction events compartment size shall be minimum 100 events.
5	**GENERALCONSTRUCTIONS**	The Meter shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal conditions, so as to ensure especially personal safety against electric shock, safety against effect of excessive temperature, protection against spread of fire, protection against penetration of solid objects, dust and water. All parts, which are subject to corrosion under normal working conditions, shall be protected effectively. Any protective coating shall not be liable to damage by ordinary handling or damage due to exposure to air, under normal working conditions. The meters shall be designed and manufactured using SMT (Surface Mount Technology) components There should not be any connector or joint in the CT connection from PCB. All CT secondary shall be soldered on PCB. The battery cell shall be button/coin type leak proof. All the material and electronic power components used in the manufacture of the meter shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy as given below or any other equivalent make with the strict approval of TPCODL:

S No	Component Function	Requirement	Makes and Origin
1.	Measurement/ computing chips	The Measurement/ computing chips used in the meter should be with the Surface mount type along with the ASICs	USA:Anolog Devices, Cyrus Logic, Atmel, Phillips, Freescale semiconductor South Africa: SAMES Japan: NEC
2.	Memory chips/NVM	The memory chips should not be affected by the externalparameters like sparking, highvoltage spikes or electrostaticdischarges. The life of NVM shall be 15 years.	USA: Atmel, National Semiconductors, Texas Instruments, Phillips, Microchip Japan:Hitachi or Oki Swiss: STMicro
3.	Display modules	The display modules should be well protected from the external UV radiations. The display visibility should be sufficient toread the meter mounted between height of 0.5m and 2m. The construction of the modulesshould be such that the displayed quantity should not disturbed with the life of display. Should be with Green LED background. It should betrans-reflective STN typeindustrial grade with extended temperature range.	Taiwan:Holtek Singapore:Bonafied Technologies Korea:Advantek China: Xiamen,Trulysemiconductor
4.	Optical port	Optical port should be used to transfer the meter data to meter reading instrument. The mechanical construction of the port should be such to facilitate the data transfer easily. It should be magnetic locking type	USA: National Semiconductors Holland / Korea: Phillips Taiwan: MAXIM, Everlight Japan:Hitachi
5	P.C.B.	Glass Epoxy, fire resistance grade I with minimum thickness 1.6 mm	A class consumer
6.	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.	USA: National Semiconductors, Atmel,Phillips, Texas Instruments, Vishay Japan:Hitachi, Oki, AVX or Ricoh Korea: Samsung
7.	Battery	Lithium with guaranteed life of 15 years	Varta / Tedirun /Vitzrocell / Sanyo or equivalent.
8.	Micro controller and RTC having separate	The accuracy of RTC shall be as per relevant IEC / IS standards and RTC shall be provided with separate battery in its ckt.. The	USA: Philips , Dallas, Atmel, Motorola Japan: NEC or Oki

				battery	micro controller shall be of superior quality from reputed make with long life.	
			9.	Temperature sensor	Temperature sensor shall be internal to the meter and its accuracy shall be as per relevant IEC / IS standards. The OEM test report to be furnished. With good performance till life of meter.	USA: Philips , Dallas, Atmel, Motorola Japan: NEC or Oki
5.1	**Meter Body**					

5.1.1 Meter body shall be made of unbreakable, high grade, fire retardant reinforced Insulating material (protective Class II) with FV0 Fire Retardant, self -extinguishing, UV stabilize, recyclable and Anti oxidation properties.

5.1.2 The minimum thickness of the meter enclosure shall be 2mm.

5.1.3 Meter base shall be opaque with polycarbonate LEXAN 500R or equivalent on prior approval from the TPCODL. (If different material offered the bidders should submit material data sheet in technical bid)

5.1.4 Meter cover shall be transparent with polycarbonate LEXAN 143R/943A or equivalent on prior approval from the TPCODL. (If different material offered the bidders should submit material data sheet in technical bid)

5.1.5 Meter cover & base shall be provided with continuous and seamless Ultrasonicwelding/chemical welding such that it is not opened without breaking the enclosure. Front cover & base shall be such that it is not possible to cut & open the meter without certainly damaging the meter body and by no means shall an attempt to reassemble would not leave physical evidence. The damage evidences should be visible externally& should be traceable in such a way that attempts can be proved in court of law.

5.1.6 The meter body shall be sealed in such a way that opening of meter base and cover is possible only after breaking the seal(s).

5.1.7 Unidirectional screws to be used on meter covers where ever required.

5.1.8 During meter manufacturing the meter seal fixing should be tightened such that the seal body should be close to meter body.

5.1.9 The Meter body shall be such that the liquid or chemical shall not reach the electronic parts if liquid is injected from any side of meter body such as meter terminals, push button, display, NIC card casing etc. Necessary protection and water tight sealing to be provided at terminals and Push buttons etc.

5.1.10 OEM should provide all required features as per OERC billing criteria in meter even if it is not mentioned in the specifications.

5.2	**Terminals, Terminal Block**	**5.2.1 Terminal block should be in single mould with meter body base. (Not separate)** **5.2.1 After any attempts the terminal block should not be able to disengaged, opened or loosen from any side.Any attempt to disengage the terminal block should certainly damage the meter body with physical evidences. The damage evidences should be visible externally& should be traceable in such a way that attempts can be proved in court of law.** **5.2.2** Terminals may be grouped in terminal block having adequate insulating properties and mechanical strength. In order to satisfy such requirements when choosing insulating materials for the terminal block adequate testing of materials shall be taken into account. 5.2.3 Terminal block and terminal cover shall be of a material which complies with the requirements of IS11731 (part 1) method FH1. The material of which the terminal block is made shall be capable of passing the Heat Deflection temperature test given in ISO 75 for temperature of 180°C and pressure of 1.8 M Pa. Tested as per ISO 75-2/A or ASTM D648. 5.2.4 The terminal block shall be of opaque with polycarbonate LEXAN500R or equivalent on prior approval from the TPCODL. (If different material offered the bidders should submit material data sheet in technical bid) 5.2.5 The terminals and connections shall be suitable to carry up to 120 % of Imax continuously (Imax 100 A). The size, design & material of Busbar /Shunt/Terminal shall be with suitable cross sectional area so that temperature rise will not be more than 20 ˚C above ambient temperature of 45˚C at 120% of I max loading for 06hrs continuous. This test of temp. rise shall be done on tender samples & will also be done on any samples from any supplied lot. 5.2.6 To get the desired temp rise & avoid hot spots the design of the each terminal screw, terminal screw shall be an Allen screw head & shall be operated with allen key only. Size of the allen screw is 8mm dia. (OEM should supply one Allen Key for every 1000 meters supplies. 5.2.7 The terminal block, the terminal cover and the meter case shall ensure reasonable safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them. 5.2.8 **Temperature sensor** to be provided from inside near the terminal block of the energy meter for sensing the temperature and meter should be programmed in such way that on reaching the threshold value set (as per tamper table no. 1) the event/alert should go the to HES/MDMS. 5.2.9 The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there is no risk of loosening or undue heating. Terminals shall be preferably with Allen screw with at least 8 mm dia for better contact area. Terminal & screw should not be damaged during regular opening and tightening. (MS terminals not accepted)

		5.2.10 Internal diameter of the terminal holes shall be minimum 9.5 mm; minimum clearance between adjacent terminals shall be 10 mm. Minimum Depth of the terminal holes shall be of 20 mm. 5.2.11 Minimum two number of terminal screws to be provided per terminal wire. 5.2.12 Terminal block shall be such that the risk of corrosion resulting from contact with any other metal part is minimized. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material. 5.2.13 The Aluminum cable of 4x50sq.mm shall be used as service line. Hence the terminals shall be provided with Zinc plating or tinning or suitable compatible coating to avoid the bimetallic effect at the joints with AL core of cable. 5.2.14 The preferred arrangement of terminals shall be linear and if any change is offered then suitable arrangement for testing at our testing lab (MMG and MTL) to be provided by bidder free of cost as per requirement.
5.3	**Terminal Cover**	5.3.1 Terminal cover shall be transparent with polycarbonate LEXAN 143R/943A or equivalent on prior approval from the TPCODL. 5.3.2 Appropriate space shall be available for incoming /outgoing cables without damaging/stressing terminal cover (terminal cover design shall be as per the TPCODLapproval). After sealing the cover, terminals shall not be accessible without breaking the seals. 5.3.3 The terminal cover design should be such that the sealing screw locking provision on cover should have min dimension of 3mmx3mm. (Excluding seal lock hole)
5.4	**Sealing of meter& terminal cover**	5.4.1 Reliable sealing arrangement shall be provided to make the meter tamper evident and to avoid fiddling or tampering by unauthorized persons. 5.4.2 For this, one no. Polycarbonate seal and three no. Hologram seal (on Left, Right & Top side) shall be provided by the bidder. 5.4.3. One no polycarbonate seal shall be provided by the TPCODL. This seal shall be fix on right hand side of meter. 5.4.4. All the seals with unique serial numbers shall be fixed on meter body by the bidder at his works before calling for inspection. 5.4.5 Two sealing provision shall be provided at meter terminal cover, such that terminal shall not be accessible without breaking the seals. All the seals shall be provided on front side only and as per the TPCODLspecification. Rear side sealing arrangement shall not be accepted. Bidder shall provide seals be as per CEA regulation (2006). Only patented seals to be used as per CEA requirements. 5.4.6 Plug in type NIC card cover should have proper sealing arrangement and should be sealed with TPCODL polycarbonate seal.

<table>
<tr><td></td><td></td><td>5.4.7 The bidder shall provide TPCODL(MMG store and MTL) the soft record of polycarbonate seal and hologram seal serial number and NIC card serial number used against each meter serial number along with its position (RHS/LHS/Top/ NIC Cover) in tabular form for every lot of meter.</td></tr>
<tr><td>5.5</td><td>TOD Feature</td><td>The meter shall be capable of measuring Cumulative Energy (kWh &kVAh), and MD (kW & kVA) with time of day (TOD) registers having 8 zones & 02 seasons (no. of zones & time slot shall be programmable by MRI with adequate security level and in one to one /broadcast mode over the air). Current TOD (during tender) to be given is as below,

<table><tr><td>Slots</td><td>Time Slot</td><td>Jan-Dec</td></tr><tr><td>Off-Peak</td><td>00:00-06:00</td><td>Register 1</td></tr><tr><td>Peak</td><td>06:00-24:00</td><td>Register 2</td></tr></table>
The bidder to ask TPCODL for latest TOD timing slots before manufacturing of every lot.</td></tr>
<tr><td>5.6</td><td>MD Integration</td><td>The MD integration period shall be 15 minutes (integration period-programmable by MRI at site and also thru AMR with adequate security level). The MD resetting shall be automatic at the 1st of the month i.e. 0000 hours of 1st day of the month. Manual MD reset button shall not be available. Last six MD values shall be stored in the memory and one to be displayed in the Auto scroll mode. MD shall be recorded and displayed with minimum three digits before decimal and minimum two digits after decimal points. MD integration shall be of sliding Type at an interval of 10 min.</td></tr>
<tr><td>5.7</td><td>Parameters in BCS</td><td>All these parameters shall be downloaded locally or remotely and interpreted in PC/Laptop. All the parameters shall be recorded and memorized in its Non volatile Memory (NVM). The corresponding non volatile memory shall have a minimum retention time of 10 years. Last six months history data (kWh &kVAh (lag only) current & TOD reading and MD(kW & kVA(lag only) current & TOD) with data and time) and at least last 25 tamper events for each tamper shall be available in the non volatile Memory.

Fail to be log in memory in the following conditions only in BCS not in display
a) RTC fail
b) NVM memory fail
c) Battery fail
d) NIC card fail

‘High THD’ to be log in memory in the following conditions only in BCS not in display

a) THDV any phase higher than threshold
b) THDI any phase higher than threshold

*Meter shall be programed at default ‘lag only’ configuration i.e. Leading power factor to be treated as unity for kVA & kVAh calculations.

All the parameters shall be as per actual without multiplying factor.</td></tr>
<tr><td>5.7.1</td><td>Load survey (for pre-paid &</td><td>The meter shall be capable of recording 15 minutes average of the following parameters</td></tr>
</table>

<table>
<tr><td></td><td>postpaid meter mode)</td><td>for at least last 45 power ON days
a) Voltage for each phase
b) Current of each phase
c) Actual neutral current
d) Average PF
e) Average kWh
f) Average kVAh (lag only)
g) kVArh(Lagging)
h) kVArh(Leading)
i) Temperature near terminal block (˚C)
j) THD Voltage phase wise
k) THD Current phase wise
l) Demand(KW)
m) Demand(KVA)

Meter shall be capable of recording daily Energy and Demand 00:00 to 24:00 Hrs kWh, kVAh, kW, kVA in BCS for 45 days. Midnight energy value of cumulative kWh, kVAh and daily consumption kWh, kVAh should be available in meter memory for last 45 days.

Load survey data should be at least with 5 decimal place</td></tr>
<tr><td>5.7.2</td><td>Instantaneous Parameters</td><td>Meter shall be capable for following Instantaneous Parameters in Memory and should be available in BCS.

<table>
<tr><td>Meter Sr.No.</td><td></td></tr>
<tr><td>Meter Type</td><td></td></tr>
<tr><td>Meter date & Time</td><td>DD MM YYYY HH MM SS</td></tr>
<tr><td>Voltage –R</td><td>000.000V</td></tr>
<tr><td>Voltage –Y</td><td>000.000V</td></tr>
<tr><td>Voltage –B</td><td>000.000V</td></tr>
<tr><td>Line Current –R</td><td>00.000A</td></tr>
<tr><td>Line Current –Y</td><td>00.000A</td></tr>
<tr><td>Line Current –B</td><td>00.000A</td></tr>
<tr><td>Actual Neutral Current</td><td>00.00A</td></tr>
<tr><td>Active Current –R</td><td>00.000A</td></tr>
<tr><td>Active Current –Y</td><td>00.000A</td></tr>
<tr><td>Active Current –B</td><td>00.000A</td></tr>
<tr><td>Reactive Current-R</td><td>00.000A</td></tr>
<tr><td>Reactive Current-Y</td><td>00.000A</td></tr>
<tr><td>Reactive Current-B</td><td>00.000A</td></tr>
<tr><td>Power factor-R</td><td>0.000</td></tr>
<tr><td>Power factor-Y</td><td>0.000</td></tr>
<tr><td>Power factor-B</td><td>0.000</td></tr>
<tr><td>Average Power factor</td><td>0.000</td></tr>
<tr><td>Instantaneous Frequency</td><td>00.000Hz</td></tr>
<tr><td>Instantaneous Load</td><td>Active ,Reactive Lag/Lead, Apparent</td></tr>
<tr><td>Present Cumulative Energy</td><td>Active ,Reactive Lag/Lead, Apparent</td></tr>
<tr><td>Cumulative Power</td><td>00000</td></tr>
</table>
</td></tr>
</table>

		Off Duration Cumulative Power ON Duration: 00000 Cumulative Tamper count: 00000 Cumulative Tamper duration: 00000 Last Billing date: dd:mm:yy Terminal Block Temperature(˚C) Vector/phasor diagram (also showing neutral current) No. of disconnector operation (Open): 00000 No. of disconnector operation (Close): 00000
5.7.3	**General Information**	Meter shall be capable for providing below mentioned general parameters in memory **Meter Serial number** Software Name Version Manufacture Name Manufacture Date (MM/YY) Meter Type Meter Class Meter Constant Meter Voltage Rating Meter Current Rating TOD profile # if any additional key is required to see this value, it should be provided without any additional cost to TPCODL.
5.7.4	**Billing Parameters**	1) Cumulative kwh, kVAh (lag only), kVArh lead, KVArhlag (all import and export) and TOD1 kWh,TOD2 kWh,TOD1 kVAh (lag only),TOD2 kVAh (lag only), For present and last 06 Resets (reset date for all resets/history, time zone register wise) 2) Maximum Demand Absolute Active Load and Absolute Apparent load and TOD1 kW,TOD2 kW,,TOD1 kVA (lag only),TOD2 kVA (lag only),), for present and last 06 Resets (reset date for all resets/history, time zone register wise) along with date and time stamp. Monthly power on/off hrs. 3) <u>Billing Dates (06 History)</u> 4) <u>Mode of operation of disconnector switch</u> Last five modes with date & time of switching with cumulative energy parameters kWh, kVAh (lag only), kVArh lead, KVArh lag (all import and export) and TOD1 kWh,TOD2 kWh,,TOD1 kVAh (lag only),TOD2 kVAh (lag only).

5.7.5	**Transactions**	All the changes in software of meter to be logged along with date & time stamp and readings. Meter should do billing if any billing related transaction is done.
5.8	**Display units**	The display unit shall be Pin type built-in liquid crystal display (Permanently backlit type LCD). The LCD shall be of STN (Super Twisted Nematic) construction suitable for maximum temperature withstands 65˚C and minimum temperature withstands 0˚C during normal operating condition. The LCD display shall have a wide viewing angle of 120 degree. When the meter is not energized the electronic display need not be visible. The display shall not be affected by electrical, magnetic disturbances and ESD. The display should be readable in direct sunlight. **The back lit must be green in color for good visibility of digits in sunlight.** The kWh &kVAh register shall have minimum 8 digits LCD display and size of the digits shall be minimum 10mmx5mm. Cumulative energy (kWh &kVAh) shall be displayed without decimal in auto scroll mode. (However decimal shall be available in push button mode for high resolution display for testing).
5.8.1	**Auto Scroll mode& push button mode in Post paid mode**	Persistence time for each parameter shall be 10 second. Values followed by header shall be avoided. (I.e. if MD1 is displayed in Auto scroll mode, Header (MD1) and value (say 5.23 kW) shall be shown simultaneously; it shall not be shown in successive displays. Off time shall not be available in auto scroll mode between each cycle. Auto scroll mode is restored after 10 sec, if push button is not operated. Display should not be stuck for any tamper events. All energy values should be without decimal. Following shall be continuously displayed in auto scroll and push button mode in the given order;

Display	**Display 1**	**Display 2**
Scroll Process	**Auto**	**Push**
LCD Check	1	1
Meter Sr. No	2	2
Date	3	3
Time	4	4
Cum. kWh	5	5
Cum. kVAh	6	6
Cum. kVARh (Lag)	7	7
Cum. kVARh (Lead)	8	8
TOD Cum. kWh (T1,T2,T3)	9,10,11	9,10,11
TOD Cum. kVAh (T1,T2,T3)	12,13,14	12,13,14
Current Month MD kW	15	15
Current Month MD kVA	16	16
Last Month (history 1) kWh	17	17

		Last Month (history 1) kVAh	18	18
		Last Month (history 1) TOD Cum. kWh (T1,T2,)	19,20,21	19,20,21
		Last Month (history 1) TOD Cum. kVAh (T1,T2,)	22,23,24	22,23,24
		Last Month (history 1) MD kW	25	25
		Last Month (history 1) MD kVA	26	26
		Last Month (history 1) Power Factor	27	27
		Phase Voltages (Vr, Vy, Vb)	28,29,30	28,29,30
		Phase Currents (Ir, Iy, Ib)	31,32,33	31,32,33
		Inst. Active Power (kW)	34	34
		Inst. Apparent Power (kVA)	35	35
		Inst.Power Factor	36	36
		Voltage Sequence (R-Y-B)	37	37
		Current Sequence (R-Y-B)	38	38
		Status of Load Switch (connected or disconnected)	39	39
		High Resolution kWh	-	40
		High Resolution kVAh	-	41
		High Resolution kVARh (Lag)	-	42
		High Resolution kVARh (Lead)	-	43
		Magnetic Tamper count	-	44
		Latest Magnetic tamper occurrence date	-	45
		Latest Magnetic tamper occurrence Time	-	46
		ESD Tamper count	-	47
		Latest ESD tamper occurrence date	-	48
		Latest ESD tamper occurrence time	-	49
		TC Open tamper count	-	50
		TC Open occurrence date of very first event	-	51
		TC open occurrence time of very first event	-	52
		Count of Connect	-	53
		Date & Time of Last Occurrence	-	54,55
		Count of disconnect	-	56
		Date & Time of Last Occurrence	-	57,58
5.8.2	**Auto Scroll mode& push button mode in Pre-paid mode**	Persistence time for each parameter shall be 10 second. Values followed by header shall be avoided. (I.e. if MD1 is displayed in Auto scroll mode, Header (MD1) and value (say 5.23 kW) shall be shown simultaneously; it shall not be shown in successive displays. Off time shall not be available in auto scroll mode between each cycle. Auto scroll mode is restored after 10 sec, if push button is not operated.		

Display should not be stuck for any tamper events.

All energy values should be without decimal.

Following shall be continuously displayed in auto scroll and push button mode in the given order;

Display	**Display 1**	**Display 2**
Scroll Process	**Auto**	**Push**
LCD Check	1	1
Meter Sr. No	2	2
Date	3	3
Time	4	4
Cum. kWh	5	5
Cum. kVAh	6	6
Cum. kVARh (Lag)	7	7
Cum. kVARh (Lead)	8	8
TOD Cum. kWh (T1,T2)	9,10,	9,10,
TOD Cum. kVAh (T1,T2)	11,12,	11,12
Current Month MD kW	13	13
Current Month MD kVA	14	14
Last Month (history 1) kWh	15	15
Last Month (history 1) kVAh	16	16
Last Month (history 1) TOD Cum. kWh (T1,T2,)	17,18,	17,18,
Last Month (history 1) TOD Cum. kVAh (T1,T2,)	19,20	19,20
Last Month (history 1) MD kW	21	21
Last Month (history 1) MD kVA	22	22
Last Month (history 1) Power Factor	23	23
Phase Voltages (Vr, Vy, Vb)	24,25,26	24,25,26
Phase Currents (Ir, Iy, Ib)	27,28,29	27,28,29
Inst. Active Power (kW)	30	30
Inst. Apparent Power (kVA)	31	31
Inst.Power Factor	32	32
Voltage Sequence (R-Y-B)	33	33
Current Sequence (R-Y-B)	34	34
Status of Load Switch (connected or disconnected)	35	35
Current Balance Amount (Current Balance)	36,37	36,37
Current Balance Date & Time	38,39	38,39
Total Balance at Last Recharge(Previous Balance)	40,41	40,41

		<table><tr><td>Last Recharge Amount</td><td>42,43</td><td>42,43</td></tr><tr><td>Last Recharge Date & Time</td><td>44,45</td><td>44,45</td></tr><tr><td>High Resolution kWh</td><td>-</td><td>46</td></tr><tr><td>High Resolution kVAh</td><td>-</td><td>47</td></tr><tr><td>High Resolution kVARh (Lag)</td><td>-</td><td>48</td></tr><tr><td>High Resolution kVARh (Lead)</td><td>-</td><td>49</td></tr><tr><td>Magnetic Tamper count</td><td>-</td><td>50</td></tr><tr><td>Latest Magnetic tamper occurrence date</td><td>-</td><td>51</td></tr><tr><td>Latest Magnetic tamper occurrence Time</td><td>-</td><td>52</td></tr><tr><td>ESD Tamper count</td><td>-</td><td>53</td></tr><tr><td>Latest ESD tamper occurrence date</td><td>-</td><td>54</td></tr><tr><td>Latest ESD tamper occurrence time</td><td>-</td><td>55</td></tr><tr><td>TC Open tamper count</td><td>-</td><td>56</td></tr><tr><td>TC Open occurrence date of very first event</td><td>-</td><td>57</td></tr><tr><td>TC open occurrence time of very first event</td><td>-</td><td>58</td></tr><tr><td>Count of Connect</td><td></td><td>59</td></tr><tr><td>Date & Time of Last Occurrence</td><td>-</td><td>60,61</td></tr><tr><td>Count of disconnect</td><td>-</td><td>62</td></tr><tr><td>Date & Time of Last Occurrence</td><td>-</td><td>63,64</td></tr></table> TOD Timing – T1(00:00hrs to 06:00hrs) T2(06:00hrs to 24:00hrs) programmable 8 zones Following parameters may be updated multiple times during life cycle of meters over the air : Enabling Post Paid to Prepaid mode and vice versa remotely Import mode to export Mode and vice versa. Accordingly Display parameters shall be updated remotely
5.9	**Output Device**	1. **Pulse Rate:** The meters shall have a suitable test output device. 2 nos of Red color blinking LED (marked as imp/kWh and imp/kVArh) shall be provided in the front. This device shall be suitable for using with sensing probe used with test benches or reference standard meters. The test output device shall have constant pulse rate of (preferred value- 400) pulse / kWh & pulse/kVArh**.** Meter constant shall be indelibly printed on the name plate as imp / KWh & imp/kVArh. 2. **Communication LCD indicator-** The meter shall be provided with suitable LCD indication for communication in progress. 3. **Load Switch LCD indicator-** The meter shall be provided with suitable LCD

		indication for condition of load switch (Close/open). LCD should show when load switch is open. 4. Phase indication : Individual phases should be displayed on LCD display of meter and shall glow with minimum operating voltage (as defined in 4.05)
6.0	**NAME PLATE AND MARKING**	Meters shall have a name plate clearly visible and effectively secured against removal. The name plate data should be laser printed. The base color of Name plate shall be blue(as of TPCODLlogo)Indelibly and distinctly marked with all essential particulars as per relevant standards along with the following. i. Manufacturer's name ii. Type designation iii. Number of phases and wires iv. Serial number (Meter serial number shall be laser printed on name plate instead of sticker). v. Month and Year of manufacture vi. Unit of measurement vii. Reference voltage ,frequency viii. Ref. temperature if different from 27 deg. C ix. Rated basic and maximum Current x. Meter constant (imp/kWh & Imp/kVArh) xi. 'BIS' Mark xii. Class index of meter xiii. "Property of TPCODL" xiv. Purchase Order No. & date xv. Guarantee period. xvi. Rated frequency xvii. Sign of double square xviii. Country of manufacture. xix. Symbol of load switch. xx. Communication Tech for WAN and NAN(with carrier frequency) xxi. Communication Technology is IHD supported (with carrier frequency). xxii. Firmware version for meter xxiii. Category However the following shall be printed in bar code on the meter nameplate.(shall be laser printed on name plate instead of sticker). 1) Manufacturer's code No.(given by TPCODL) 2) Meter Sr. No 3) TPCODL Property 4) Month/Year of manufacture. The PCB Serial number should be printed on PCB instead of sticker. **Bidder should ensure that NIC provided in meters are having laser printing of Sr. No., MFG date, 'Property of TPCODL' marked, PO date and no. (same as that of meter PO)**
7.0	**TESTS**	All routine, acceptance & type tests shall be carried out on the meter and meter body

<table>
<tr><td></td><td></td><td>separately in accordance with the relevant IS/IEC. All routine/acceptance tests shall be witnessed by the TPCODL/his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted in addition to the tests specified in IS/IEC.</td></tr>
<tr><td>7.1</td><td>TYPE TEST</td><td>1) All tests as defined in IS 16444 Part-1: 2015 /IS 13779:1999 & IS15959 Part-2: 2016.
2) Test against abnormal magnetic influence as per CBIP TR 325.
3) Meter shall be type tested as per BIS16444 part-1</td></tr>
<tr><td>7.2</td><td>ROUTINE TEST</td><td>1) AC High Voltage test
2) Insulation test
3) Test on limits of error
4) Test of starting current
5) Test of no load condition</td></tr>
<tr><td>7.3</td><td>ACCEPTANCE TEST</td><td>1) AC High Voltage test
2) Insulation test
3) Test on limits of error with following loads
<table><tr><td>120% I max(120A)</td><td>I max (100A)</td><td>Ib(20A)</td><td>0.5 Ib (10A)</td><td>0.1Ib (2A)</td><td>0.05Ib (1A)</td></tr><tr><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 Lead and 0.5 lag</td><td>UPF</td></tr></table>4) Test of meter constant
5) Test of starting current
6) Test of no load condition
7) Test of repeatability of error.
8) Test of power consumption.
9) Test for Immunity against external influencing signal as per the TPCODL specification
10) Test for Immunity against DC Immunity as per the TPCODL specification
11) Test for Immunity against Tamper conditions as per the TPCODL specification
12) Error measurements with all abnormal condition along with ESD, magnet,
13) Test to Influence of Harmonics
14) Supply voltage and frequency variation test
15) Testing of self diagnostic features
16) Tamper count increment and logging with date and time in meter database
17) All tests as defined in IS 15959(Part-2):2016
18) Functionality of communication module is 16444 part2
19) smart meter communicability as per provision of 28 IS 15959 (part-3)
20) Meter reading on HES demand, Scheduled meter reading from HES, remote firmware upgrade from HES and all programming request from HES to be simulated and checked during inspections.
21) Physical check of NIC and replaceable ease of the NIC module in meter.
22) Any other test required as per latest IS 16444, 15999 and relevant parts shall be tested during inspections.</td></tr>
<tr><td></td><td>a) METER BOX</td><td>Acceptance Tests
Physical verification of dimensions of the box.
Compatibility of the box for housing the Meter, and ensuring ease of connecting and</td></tr>
</table>

		reading the meter. Test for mechanical strength. . Routine Tests : The routine test certificates for the following shall be furnished for approval of the purchaser. Physical verification of dimension of the box. Compatibility of the box for housing the meter ensuring ease of connecting and the reading the meter. Meter box shall be of polycarbonate transparent type(Degree of protection-IP55) Meter Box should have push button compatible with meters push button. Box should have optical port grove in line with meter optical port slot. There should be locking provision available for meter optical cord. The arrangement should be such that meter can be read through optical cord without opening the meters box. Terminal of the meters should not be accessible through Glands of the meters once the cable in installed. There should be minimum 20 mm spacing between meter and meter box from all sides. From front it should be minimum 10 mm and behind it should be minimum 5 MM.
7.4	**Special Test**	1) The bidder shall demonstrate the communication capability of the meter through communication modes as defined in the specification before conducting acceptance tests. 2) Temperature rise of terminal block with 120% Imax for 6 hours.
8.0	**TYPE TEST CERTIFICATE**	The bidder shall furnish the type test certificates of the meter for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ ERDA/ UL laboratory as per BIS 16444 part-1. For communication testing any national approved laboratory or international acclaimed lab or equivalent will also suffice at the discretion of TPCODL. For technical evaluation of the tender, we may consider Type test report as per IS 13779. In such case the Bidder should provide IS16444 compliant test report before starting of supply of meters. Type test should have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPCODL.
9.0	**PRE-DESPATCH INSPECTION**	The successful bidder shall submit four prototype samples (non-returnable) of meters for further testing and compliance as per specifications and get approval before mass manufacturing. Inspection may be made at any stage of manufacture at the discretion of the TPCODL of the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection.

		Equipment shall be subject to inspection by a duly authorized representative of the TPCODL. Bidder shall grant free access to the places of manufacture to TPCODL's representatives at all times when the work is in progress. Inspection by the TPCODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCODL. Following documents shall be sent along with material a)Pre dispatch Inspection Test reports b)MDCC issued by TPCODL c)Invoice in duplicate d)Packing list e)Drawings & catalogue f) Guarantee / Warrantee card g)Delivery Challan h)Other Documents (as applicable) Note-Photographs of packed lot clearly showing s.no of meters whose inspection call has been requestedshould be sent along with letter for inspection call. Two meters from the offered lot shall be tested for all tampers at TPCODL laboratory for compliance to anti tamper feature before MDCC. The inspectors shall free to take any two meters from offered lot for testing at our Lab. Bidder should check and ensure each meter and reset each meter for any event logged for any tamper.
10.0	**INSPECTION AFTER RECEIPT AT STORE**	The material received at TPCODL's store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Plant Engineering department.
11.0	**GUARANTEE**	Bidder shall stand guarantee towards design, materials, workmanship & quality of process / manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the TPCODL up to a period of at least 60 months from the date of commissioning or 66 months from the date of last supplies made under the contract whichever is earlier, Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Company, failing which the TPCODL will be at liberty to get it replaced/rectified at bidder's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the bidder or from the " Security cum Performance Deposit" as the case may be. Bidder shall own responsibility for all internal component with an end to end agreement with individual component manufacturer.
12.0	**PACKING**	1. Bidder shall ensure that all material covered under this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit. The material used for packing shall be environmentally friendly. Packing and transportation shall be as per IS 15707:206 clauses 9.1 and 9.2.

		2. Individual meter should be packed in separate box. Routine test report (with min. tests as defined in 7.2) of the individual meter shall be kept inside each card board carton of the meter. **3.** On back side of RTC the bidder shall print a picture of the meter with its small details like for consumer to know about meter. **4.** The softcopy of the routine test certificate of each meter to be provided with each lot to TPCODL, MMG stores at BHUBANESWAR. **5.** The routine test certificate shall contain results & all tests of clause no. 7.2.
13.0	**TENDER SAMPLE**	Bidders are required to manufacture 03 sample meters as per the TPCODL specification (sealed, unsealed and openable base and cover to view/test the inner circuits)and submit (non-returnable) the sample along with bid for approval. The tender sample as per IS 13779 & IS 15959 shall be acceptable for verification and other checks. The samples shall be retained at TPCODL. Following accessories to be submitted along with sample 1) Detailed manual 2) Communication cords 3) Tamper logic sheet 4) Display parameter annunciator 5) BCS and 6) Internal connection diagram. Bidder to demonstrate all communication features during sample testing.
14.0	**QUALITY CONTROL**	The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. Quality should be ensured at the following stages: • At PCB manufacturing stage, each board shall be subjected to computerized bare board testing. • At insertion stage, all components should undergo computerized testing for conforming to design parameter and orientation. • Complete assembled and soldered PCB should undergo functional testing using Automatic Test Equipment (ATEs). • Prior to final testing and calibration, sample meters shall be subjected to aging test (i.e. meters will be kept in ovens for 24 hours at 55 DegC temperature and atmospheric humidity under real-life condition at its full load current. After 24 hours meter should work satisfactorily. TPCODL's engineer or its nominated representative shall have free access to the bidder's/manufacturer's works to carry out inspections.
15.0	**MINIMUM TESTING FACILITIES**	Bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards. The bidder shall have duly calibrated Reference Standard meter of Class 0.1 accuracy or better.
16.0	**MANUFACTURING ACTIVITIES**	The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart shall be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.

17.0	**SPARES, ACCESSORIES AND TOOLS**	1. Bidder to be provide free of cost 02 nos of jig for retrieving data from memory of meter with every new design of meter in which previous jig is supplied cannot be used. Jig should be such that NVM can be push fit on this jig and data can be retrieve from this NVM. 2. Fifty 50 nos. of optical cord to be provided in first lot for retrieving the data of meter through optical port. Once supplied, it is not required in subsequent lots.
18.0	**DRAWINGS AND DOCUMENTS**	Following drawings & Documents shall be prepared based on TPCODL specifications and statutory requirements and shall be submitted with the bid: a)Completely filled-in Technical Parameters. b)General arrangement drawing of the meter c)Terminal Block dimensional drawing d)Mounting arrangement drawings. e)General description of the equipment and all components with makes and technical requirement f) Type Test Certificates g)Experience List After the award of the contract, soft copies of following drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval:

S. No.	Description	For Approval	For Review Information	Final Submission
1	Technical Parameters	√		√
2	General Arrangement drawings	√		√
3	Terminal block Dimensional drawings	√		√
4	Mounting arrangement drawing.	√		√
5	Manual/Catalogues		√	
6	Transport/ Shipping dimension drawing		√	√
7	QA &QC Plan	√	√	√
8	Routine, Acceptance and Type Test Certificates	√	√	√

Bidder shall subsequently provide Soft copy of all the drawing, GTP, Test certificates for the final approval of TPCODL.

All the documents & drawings shall be in English language.

19.0 GUARANTEED TECHNICAL PARTICULARS

A) Meter details-

Sr.No	Description	Units	As Furnished by Bidder
1	Type of meter		
2	Accuracy Class of the meter		
3	Ib& Imax	A	
4	a. Operating Voltage for meter b. Operating Voltage with communication unit functionality	V	
5	Operating Frequency	*Hz*	
6	Power Consumption and Burden		
7	Starting Current	mA	
8	Short time over current	A	
9	Influence of heating		
10	Rated impulse withstand voltage	KV	
11	AC withstand Voltage for 1 min	KV	
12	Insulation resistance a) Between frame &Current, voltage circuits connected together: b) Between each current(or voltage circuit) & eachand every other circuit.	M ohm	
13	Mechanical requirement as per IS 13779		
14	Resistance to heat and fire (As per specification)		
15	Degree of protection		
16	Resistance against climatic influence (as per IS 13779)		
17	Electromagnetic Compatibility (EMC)		
18	Accuracy requirements (As per IS 13779		
19	Power factor range		
20	Energy measurement		
21	Connection Diagram for system on terminal cover	Yes/No	
22	Self diagnostic features		

			23	Initial start up of meter (meter shall be fully functional within 5 sec after reference voltage is applied to the meter terminals)			
			24	Terminal block a)Depth of the Terminal holes b)Internal diameter of terminal holes c) Clearance between adjacent terminals	 mm mm mm		
			25	Communication capabilities as per clause 4.3			
			26	Immunity & logging againstabnormal Magnetic influence, as defined in Cl. 4.4			
			27	Immunity & logging against ESD/Jammer as defined in Cl. 4.4			
			28	DC & other tampers Immunity and logging as defined in Cl. 4.5			
			29	Abnormal tamper events and logging with snapshot in all Conditions as per table no-1	Yes/No		
			30	Grade/Name of material used for a) Meter base b) Meter cover c) Terminal block d) Terminal cover			
			31	Tamper counters	Yes/No		
			32	Recording forward energy in all tamper conditions	Yes/No		
			33	Display back lit color			
			34	Non Volatile memory (Retention period)			
			35	Measuring elements used in the meter			
			36	Power supply to circuit in case of supply failure			
			37	Display of measured values (As per specification –clause 5.8)	Yes/No		
			38	LCD display (Type and viewing angle)			

			39	Pulse rate	Imp/kWh, Imp/kVArh	
			40	Name plate marking with laser printer	Yes/No	
			41	Routine test certificates	Yes/No	
			42	Acceptance test Certificates	Yes/No	
			43	Type test certificates	Yes/No	
			44	Guarantee certificates	Yes/No	
			45	Output Device(LEDs) As per Cl.5.9	Yes/No	
			46	Make of Disconnector Switch		
			47	Disconnector Technical particular asper Specification Cl no- 4.1	Yes/No	
			48	Terminal Screw dia.		
			49	Allen Screw head size& Screws per wire (Terminal Screw)		
			50	Fire retardant category of the material a. Meter body b. Terminal block		
			51	Meter sealing as per clause 5.4		
			52	Temperature Sensor near terminal block at incomer side		
			53	Ultrasonic welding of cover and base		
			54	Providing zig for NVM data retrieval after meter damaged at site as per clause no. 17		
			55	NIC module with cover & sealing arrangement		
			56	Meter shall be programed at default 'lag only' configuration i.e. Leading power factor to be treated as unity for KVA & KVAh calculations, except for instantaneous parameters where values and Vector Diagram should show actual kVAh considering lead and Lag both.		
			57	Dimensions of the meter LxBxH		

58	Terminal material		
59	Terminal Screw material and plating details		
60	Harmonics Recording- The recording of harmonics up to 20th harmonic Average THD of all phase for voltage THD and current THD.		
61	Accuracy of harmonics recording		

B) Component data

S No	Component Function	Requirement	Makes and Origin
1.	Measurement/ computing chips	The Measurement/ computing chips used in the meter should be with the Surface mount type along with the ASICs	
2.	Memory chips/NVM	The memory chips should not be affected by the externalparameters like sparking, highvoltage spikes or electrostaticdischarges. The life of NVM shall be 15 years.	
3.	Display modules	The display modules should be well protected from the external UV radiations. The display visibility should be sufficient toread the meter mounted between height of 0.5m and 2m. The construction of the modulesshould be such that the displayed quantity should not disturbed with the life of display. Should be with Green LED background. It should betrans-reflective STN typeindustrial grade with extended temperature range.	
4.	Optical port	Optical port should be used to transfer the meter data to meter reading instrument. The mechanical construction of the port should be such to facilitate the data transfer easily. It should be magnetic locking type	
5	P.C.B.	Glass Epoxy, fire resistance grade with minimum thickness 1.6 mm	

			6.	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.
			7.	Battery	Lithium with guaranteed life of 15 years
			8.	Micro controller and RTC having separate battery	The accuracy of RTC shall be as per relevant IEC / IS standards and RTC shall be provided with separate battery in its ckt.. The micro controller shall be of superior quality from reputed make with long life.
			9.	Temperature sensor	Temperature sensor shall be internal to the meter and its accuracy shall be as per relevant IEC / IS standards. The OEM test report to be furnished. With good performance till life of meter.

ANNEXURE-II

PART-A/ LOT-3

TECHNICAL SPECIFICATION FOR

TWO YEAR RATE CONTRACT FOR

SUPPLY OF

THREE PHASE LTCT SMART ENERGY METER

UNDER SMART METERING PROJECT

Tender Enquiry No.

TPCODL/ P&S/ 167 (Part-A/ Lot-3)/ 2020-21

CONTENTS

1	**SCOPE**	This specification covers the technical requirements of design, manufacturing, testing at meter manufacturer's works ,packing, forwarding, supply and unloading at store/site of three phase four Wire,3x230 voltage,100/5A, 200/5A current transformer operated ac static meters of accuracy class 0.5S (here after referred as meters) complete with all accessories for efficient and trouble free operation with communication module (NIC) compatible with 4G and fall back to 2G technology. It is not the intent to specify completely herein all the details of tech design and construction of material. However, the material shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in manner acceptable to the TPCODL, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered material shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.
2	**APPLICABLE STANDARDS**	The equipment covered by this specification shall conform to the requirements stated in latest editions & amendments of relevant Indian/ IEC Standards and shall conform to the regulations of local statutory authorities.

a	IS 16444 part 2 : 2017	A.C. Static Transformer operated watt hour and VAR-hour meters, class 0.2s, 0.5s & 1.0S
b	IS 15959 Part 3 :2017	Data exchange for electricity meter reading, tariff and load control
c	IS 9000	Basic Environmental testing procedure for electrical and electronic items.
d	IS 12346:1999	Testing Equipment For Ac Electrical Energy Meters
e	IS 11000	Fire Hazard Testing
f	IEC 62052 Part 11 : 2003	Electricity metering equipment (AC) - General requirements , tests and test conditions – metering equipment
g	IEC 62053 Part 22 : 2003	Electricity metering equipment (a.c.) - Particular Requirements - Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)
h	IS 15707 : 2006	Testing Evaluation installation and maintenance of AC Electricity Meters- Code of practice.
I	IEC 60068	Environmental testing.
J	CBIP–TR No.325	Specification for A.C. Static Electrical Energy Meters (latest amendment)
K	CEA Regulation (2006)	Installation and operation of meters Dtd: 17/03/2006.
l	IS 60529	Degree of protection provided by enclosure

		j | IEC62056-61 | Electricity metering- Object Identification system (OBIS)
3	**CLIMATE CONDITIONS OF THE INSTALLATION**	a) Max. Ambient Temperature : 50 deg.C b) Max. Daily average ambient temp. : 40 deg.C c) Min Ambient Temp : 0 deg C d) Maximum Humidity : 95% e) Minimum Humidity : 10% f) Average No. of thunderstorm days per annum : 50 g) Maximum Annual Rainfall : 750 mm h) Average No. of rainy days per annum : 60 i) Rainy months : June to Oct. j) Altitude above MSL not exceeding : 300 meters k) Wind Pressure : 126 kg/sq m up to an elevation at 10 m. The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.3 g.
4	**GENERAL TECHNICAL REQUIREMNTS**	

S.No.	DESCRIPTION	REQUIREMENT
4.01	Type of the meter	Three phase four wire, current transformer operated static watt-hour meter. It consisting of measuring elements(s),time of use of register(s) and display and plug in type bi-directional communication module all integral within the meter housing. .
4.02	Accuracy Class of the meter	0.5S
4.03	Basic Current (Ib) & rated Maximum current (Imax)	Ib= 5A; Imax= 10 Amps
4.04	Reference Conditions for testing the performance of the meter	Vref = 230 V Frequency = 50Hz Temperature= 27 C ^{0}C
4.05	Operating Voltage	Meter shall be operational with required accuracy from0.6 Vref to 1.2 Vref. However meter shall withstand the maximum system Voltage of 440Vbetween phase and neutral (for minimum 5 min).

		4.06	Operating Frequency	50 Hz± 5%.
		4.07	Power Consumption	Voltage circuit: Maximum 5W and 15 VA Current Circuit :Maximum 4VA (The additional power requirement during data transmission shall not exceed 7Was mentioned in IS 16444 whichever is lower, per communication module)
		4.08	Starting Current	5mA (0.1% of Ib)
		4.09	Short time over Current	200 A for 0.5sec (20Imax)
		4.10	Influence of heating	Temperature rise at any point of the external surfaceof the meter shall not exceed by more than 20K with an ambient temperature at 50^0 C.
		4.11	Rated Impulse withstand voltage	6KV (shall be applied ten times with one polarity and then repeated with the other polarity and minimum time between each impulse to be 3 sec)
		4.12	AC withstand Voltage for 1 min	4 KV
		4.13	Minimum Insulation resistance at test voltage 500+/- 50 V dc a)Between frame & current ,voltage circuits as well as auxiliary circuits connected together: b)Between each current (or voltage circuit) & each and every other circuit. :	a) 5 M ohm b) 50 M ohm.
		4.14	Mechanical requirements	Meter shall be in compliance with clause 12.3 of IS 1469 and IS16444 part 2
		4.15	Resistance to heat and fire	The terminal block and Meter case shall ensure safetyagainst the spread of fire. They shall not be ignitedby thermal overload of live parts in contact with them as per clause 6.8 of IS 14697. Fire retardant material shall be used.
		4.16	Protection against penetration of dust and water.	Degree of protection:IP 51 as per IS 12063/60529, but Without suction in the meter. Meter shall comply with clause 6.9 and 12.5 of IS 14697
		4.17	Resistance against Climatic influence.	Meter shall be in compliance with clause 12.6 of IS 14697.

		4.18	Electromagnetic Compatibility (EMC)	Meter shall be in compliance with clause CBIP report 325 and IS
		4.19	Accuracy requirements	Meter shall be in compliance with clause 11 of IS 14697& IS16444 part-2.
		4.20	Power factor range	Zero lag to Zero lead. & meter shall be programed at default 'lag only configuration i.e. Lead to be treated as unity for kVA&KVAhcalculations'
		4.21	Energy measurement	Fundamental energy +Energy due to Harmonics
		4.22	Connection Diagram	The connection diagram for the system shall be provided on terminal cover.
		4.23	Self Diagnostic feature	The meter shall have logging with date and time in memory for un satisfactory /non-functioning of (i) Real Time Clock (ii) RTC battery (iii) Non Volatile Memory (iv) NIC card status
		4.24	Initial start up of meter	Meter shall be fully functional within 5 sec after reference voltage is applied to the meter terminals.
		4.25	Alternate mode of supply to the meters	In case of meter power failure , reading/data should be retrieved with the help of battery.
		4.26	Sleep Mode	Meter shall not go in sleep mode. Display should not be 'off' at any point of time when power up.
		4.27	Internal diameter of the terminal holes Depth of the terminal holes	5mm (minimum) 20 mm (minimum)
		4.28	Clearance between adjacent terminals	10 mm (minimum)
		4.29	Display	Backlit LCD, Scrolling, 10 seconds for each parameterminimum 8 digitsfor reading LCD display
		4.30	Security feature	Programmable facility to restrict the access to the information recorded at different security level such as read communication, write communication,firmware selection from remote etc.
		4.31	Software and communication compatibility	The bidder shall supply software required for local (MRI – conventional/4G) & remote (AMI) connectivity including required training to use the software free of cost. Following parameters may be updated multiple times during life cycle of meters over the air : Post Paid to Prepaid mode and vice versa Import mode to export Mode and vice versa. Accordingly Display parameters shall be updated remotely.
		4.32	Calibration	Meters shall be software calibrated at factory and modifications in calibration shall not be possible at site by any means. However parameters like

				RTC,TOD slots, DIP(billing & load survey), display parameters, billing date, etc. shall be reconfigure through MRI and remotely over the air (OTA)and any other support will be provided without any additional cost to TPCODL till the useful life of the meters.
		4.33	Usage Application	Indoor and Outdoor
		4.34	Ultrasonic welding / Chemical Bonding	Meter cover and body should have seamless ultrasonic welding or should be seamlessly chemically bonded, so that meter should not open without leaving clear mark.
		4.35	Communication module of meter for AMI	As per clause no 1.4 (b) of IS 16444 part 2. Meter should have provision of communication module compatible with both the variant mentioned in IS 16444 part 2. This module should be able to get connected to the NAN / WAN network of service provider (4G) of TPCODL. With the advent of Low Power Wide Area Network radio technology and the service providers offering 4G services, Tata Power intends to leverage 4G as the primary communication technology with hot swappable 2G /3G Interface Card as a fall back for meter data acquisition. Meter should be able to provide required power supply to NIC card provided by communication provider recommended by TPCODL. Size /form factor of NIC card will be provided by TPCODL to the bidder and bidder should make necessary arrangement for the same.
		4.36	Communication Layer Protocol	Should be as per clause 8.3 of IS 16444 part 2
		4.37	Key Management and Security Feature	Should be as per IS 15959 part 2 and 3
		4.38	Harmonics recording	The meter should record the current and voltage THD.The meter should record harmonics up to 20th harmonic Average THD of all phase for voltage THD and current THD. THD values shall have 30 minutes integration period in load survey. Accuracy of harmonics recording shall be as per meter accuracy class. The meter shall generate a flag/event whenever the threshold (user configurable) of the 5% THD of the load current and voltage is breached.

		4.39	The terminal pin arrangement	The terminal pin shall be 12 pin,zig zag arrangement with phase voltage terminal in between current terminals as mentioned in clause no. 5.2.12&13
		4.40	The preferred meter size shall be	235x300x120mm (further the bidder can check details space available in existing box at our MMG store before design)
4.1	**NIC MODULE DETAILS & INTEGRATION**	With the service providers offering 4G services, TPCODL intends to leverage 4G as the primary communication technology with hot swappable 2G Interface Card as a fall back for meter data acquisition. a) The Network Interface Card for 4G shall be modular and pluggable. The NIC shall be interoperable for service provider b) NIC card shall support remote Device Management Capability such as Reset, Configuration, Log Check, Ping, and over the air Firmware upgrade c) NIC shall support two-way communications between smart meter & head-end system such as data exchange, configuration parameters exchange, alarms, operational commands, firmware upgrade of the meter as defined in IS16444 and IS15959. d) NIC shall support push services, alarms services of the smart meter as defined in IS16444 and IS15959. e) 4G NIC card shall support communication protocols as prescribed by 4G HES supplier. f) NIC shall also support on-demand / schedule reading, time sync, configuration and over the air firmware upgrade from the head-end system. g) NIC shall have persistent network connectivity throughout as defined by 4G standards. It shall support self-configuring features. h) NIC shall operate 24*7 and shall recover from any deadlock situation immediately in the field. i) Support for possibility for provision of a unique certificate/key in each card for mutual authentication with the HES from security point of view. j) NIC shall support standard security protocols. k) NIC shall be compliant with cyber security norms. l) NIC shall register with network i.e. login and logout of each terminal to the HES. It shall be recognized in the HESas authorized node. m) Attributes such as Firmware version, Hardware version, Signal strength values, packet error rate, should be pushed periodically to HES for effective communication management. n) Data must be encrypted with AES-256 bit. o) LED indication for System, Power ON indicator. p) Colour coded LED (a) For latching on to the network (b) For latched on to the network (c) For data flow indication. q) Meter display should have provision for showing if NIC card if : 1. Installed, 2. Getting Network, 3. Latched with HES, 4. Communicating with HES		
4.2	**Communication capabilities and software feasibilities**	4.3.1 The meter shall have facilities for data transfer locally through Meter Reading Instrument (MRI) (Using optical port/NIC card) and remotely by 4G with proper security via Plug in type NIC. Data transfer locally through optical port via MRI is desired along with data transfer through NIC card. The data downloaded in MRI/hand held device shall be integrated to HES data base.			

		4.3.2 It should be the responsibility of the bidder to ensure integration of meter into HES. For cellular fallback, the Module should have backward compatibility. The fall back provision shall be taken through optical port with external modem by TPCODL. Meter should be capable for sending all data from 4G NIC and optical port. 4.3.3 It shall be possible to reconfigure the meters for RTC,TOD slots reprogramming, DIP (Demand Integration period), billing date ,display parameters etc. through proper authentication process locally through MRI and remotely over the air (OTA). Meter data should remain intact with timings. And billing should be done whenever any above mentioned attribute is changed. The change should be recorded as upgrade event. 4.3.4 Necessary keys if required for performing this reconfiguration operation should also be provided along with supply of meter lot & training to TPCODL staff on how to use it free of cost. Bidder to provide this support on a later stage also on the request of TPCODL without any cost implication. 4.3.5 Optical Communication port shall be available for communication. Communication ports shall not be affected by any type of injection /unauthenticated signals and having proper sealing arrangement. The complete data shall be downloaded within 5 minutes OTA. 4.3.6 Bidder to ensure integration of meter data with head end for data transfer as mentioned in specification. 4.3.7 Meter should be supplied to TPCODL along with integrated NIC card. NIC card should be plug in type with proper sealing arrangement. 4.3.8 The bidder shall supply software required for local (MRI) & remote (AMI) connectivity including required training to use the software free of cost. Bidder shall provide the communication protocol / APIs for communication with meter through local (MRI) / remote (AMI) as and when required by TPCODL free of cost during life time of meter. The bidder should provide DLMS compliance for Communication with the meter at Optical port and at HES. 4.3.9 Bidder should also provide software for changing/upgrading meter firmware in mass and should support integration of this software with HES. Bidder should also provide base computer software (BCS) for viewing the data downloaded through HES/MRI/laptop/HHU in separate PC/laptop. Android based or windows based HHU shall be preferred. 4.3.10 For purpose of exercising control, like outage management, the meter should send abnormalities at the consumers' end like Power failure (Last Gasp) instantly, Power Restoration (First Breath) as event. Additional exceptional events should also be communicated to HES by meter immediately after the occurrence through RF / RF Mesh. It should also indicate the restoration of the same event. 4.3.11 List of events to be reported should be configurable over the air(OTA).The meter should have "Last Gasp" and “First Breath” feature to facilitate sending

		alerts to the HES during fully powered off / On condition. 4.3.12 If there are 2 requests given for communication one from HES and other from local device, request from local device should supersede. 4.3.13 Last mile mesh network must support auto-registration and self-healing feature to continue operation using easiest possible available route in case of failure of any communication device in the mesh. Self-registrations in first communication. 4.3.14 Meter Serial no will be used for tagging of all data of the meters in all database (at HES / MDM/ DCU level etc). However, it will be the responsibility of the Bidder to establish the complete communication solution involving all the meters in the system. Also, the Bidder must ensure that, the mode of communication used for RF shall be consistent with the Government of India stipulations. Bidder should come out with it requirements for integration of meter with HES and MDMS clearly during tender submission. 4.3.15 The Bidder's supplied meter with third party communication module should have suitable hand-shaking features to allow a third-party MDMS(procured by TPCODL) to configure, command, read and control smart meters installed at site. The Bidder shall extend all necessary assistance in developing the adaptor software through a third-party for facilitating the above. 4.3.16 Integration of meter software's with HES / MDMS for seamless transfer of data will also be in scope of bidder till the expiry of warranty of the meters. It is desired meter firmware up gradation/selection should be available over the air. Meter should be able to change to prepaid mode if required with firmware upgrade. The required firmware and any required support for integration with HES shall be provided free of cost till the useful life of the meter. 4.3.17 Communication of the meter at optical port /OTA (NAN/WAN) should be as per IS 15959 (Part-2):2016. The optical port should be with proper lockable mechanism 4.3.18 Communication NIC/network should be immune with any external Magnetic field/ESD/Jammer/HV voltage influence such that it shall not affect the normal overall functionality. 4.3.19 Meter once powered up with NIC card should be self-detected by RF network and its basic name plate details & current readings are transferred to HES. 4.3.20 The required OBIS codes will be finalized with successful bidder. The bidder can offer desired codes from Blue Book ensuing the codes reserved or standardized by Bureau of Indian standards. The reserved codes in BIS are to be used/utilized as per guidelines of BIS and remaining codes from blue book can be used for communication of additional features mentioned in this specifications. This is to be done strictly with written approval from TPCODLafter verification of proposed codes by manufacturer. In future if BIS adds any OBIS codes then the bidders to provide upgraded firmware with desired changes after in consultation and approval of TPCODLcompetent authority.

		4.3.21 Meter display should have provision for showing if NIC card if : 1. Installed, 2. Getting Network, 3. Latched with HES, 4. Communicating with HES 4.3.22 If any tamper occurs in power off situation, it should be pushed as soon as the meter is powered on. 4.3.23 Bidder to provide facility for Up-gradation / Modification of Firmware 4.3.24 Following parameters may be updated multiple times during life cycle of meters over the air : Post Paid to Prepaid mode and vice versa Import mode to export Mode and vice versa. Accordingly Display parameters shall be updated remotely.
4.3	**Immunity against external influencing signals**	**4.3.1 Magnetic Field:** Meter shall record accurate energy in case of any external influencing signals in line with IS 14697:1999 Cl.11.2 and variation in limits of error (upto 100% Imax) shall be as per the table 13 of IS 14697. Meter shall be immune to any magnetic field such that it shall not affect the normal overall functionality However, in case of abnormal magnetic field as defined below meter shall perform as per the following actions: a. Meter shall log the event in its memory as" Magnet" with date and time stamp along with snapshot and the event logging threshold values as per table no. 1 in 4.5 b. The energy recording to shift on I max, Vref. with UPF. **Abnormal Magnetic field is defined as below;** a. Continuous DC magnetic induction: **>**0**.**20 Tesla ± 5% (Value of the magneto motive force to be applied shall be generally >10000 AT. b. AC magnetic induction: **>**10 milli Tesla (if produced with circular metal core with square cross section as specified in CBIP latest report with 2800 AT) **c.** Permanent Magnet: Immune up to 0**.**5T and Event logging **>**0**.**5T. **4.3.2 Electrostatic Discharge (ESD)** Meter shall be immune up to 50 kV and shall record accurate energy as per IS-14697:1999/CBIP-325. Meter shall log the event into memory as 'ESD' with date & time stamp for any ESD greater than 50 kV with snap shot, the event loggingthreshold values as per table no. 1 in 4.5. 4.3.3The shielding around the meter shall be such that it does not get affected by high Voltage and high energy or low energy impulse when comes in contact with meter from any side. 4.3.4 Meter should immune to high/low frequency jammer devices. Meter shall log the

		event in its memory as" JAMMER" with date and time stamp along with snapshot, the threshold values as per table no. 1 in 4.5. 4.3.5 The meter should be immune or log the tamper on application of any other higher magnetic field of any frequency waves, micro waves like magnetron etc. the threshold values as per table no. 1 in 4.5.
4.4	**Neutral Disturbance & other tampers**	4.4.1 The meter shall not saturate on passage of direct current, which can cause the meter either to stop recording/ record inaccurately. DC injection shall be tested both in phase and neutral. Measurement by meter shall not get influenced by injection of Chopped signal/ DC signal/ DC pulse upto 330V and for any value beyond this. Meter shall log the event into memory as 'Neutral Disturbance' with date & time stamp the thresholds are as per table no. 1 in 4.5 4.4.2 The meter should log event with snapshot when all three phase currents are zero and neutral current is present. 4.4.3 An event to be provided for invalid phase association with name 'Invalid phase association'
4.5	**Abnormal Tamper conditions**	4.5.1 The meter shall record forward energy under all abnormal tampering conditions and shall be capable of recording occurrence and restoration of abnormal events listed below along with date & time and snap shots of individual voltages, currents, power factors, active energy and apparent energy at the time of occurrence of abnormal event and restoration of normal supply. 4.5.2 For all tamper events the time stamp and snapshot parameters shall be recorded at the start time of event for occurrence (T1) and for restoration the time stamp and snapshot parameters shall be recorded at the end time of the event (T3). 4.5.3 During abnormal & tamper conditions, the current shall be recorded as active current and line current. Each such event shall be provided with minimum count of as per table no.1 to avoid missing of data amidst usual events (like power failure) due to the limitation of FIFO. Persistence time for occurrence and restoration for the events along with their threshold values shall be as per table no. 1 given below. 4.5.4 The events for which the restoration not occurred those should not be removed from meter memory and FIFO should not be applicable for unrestored event. 4.5.5 Tamper event logging along with snapshot during occurrences & restorations shall be as per table no.1. The smart meters manufacturing samples should start recording the abnormal influencing signals with intensity values as defined in the

specifications.

4.5.6 All tamper/event logging thresholds values shall be configurable from remotes.

Table No.1

Persistence Time for Occurrences	**Persistence Time for Restoration**	**Threshold Value for Occurrence of Events**	**Threshold Value for Restoration of Events**	**Compartment Size**
ESD/JAMMER=immediate (record only 1 event on first application & only one event for next 1min) (ESD)	ESD/JAMMER = 0 Hr 01 Min 0 sec (ESD) (should restore after 1 min. of last application)	Immunity up to 50 KV with NIC and logging of event>50 KV	Removal of ESD/JAMMER signal	25
Magnet = 0 Hr2 Min 0 sec (MAG)	Magnet = 0 Hr 2 Min 0 sec (MAG)	>0.5 Tesla for permanent magnet OR DC magnetic induction >0.2T OR AC magnetic induction > 10 mT (of any frequency)	<0.5 Tesla for permanent magnet OR DC magnetic induction < 0.2T or AC magnetic induction <10 mT	25
Meter Top Cover Open (TC Open) Immediate	Meter Top Cover Open (TC Open) Immediate	If meter top cover is opened	NA	05 (Stay put Type)
Potential Missing = 0 Hr 10 Min 0 sec (PM)	Potential Missing = 0 Hr 2 Min 0 sec	Voltage < 70% of Vref AND current > 2% Ibasic	Voltage > 80% of Vref AND current > 2% Ibasic	25
Voltage Unbalance = 0 Hr 30 Min 0 sec (VU)	Voltage Unbalance = 0 Hr 2 Min 0 sec	20% or more between the phases and current > 2% Ibasic	Shall be less than 10 % between the phases and current > 2% Ibasic	25
CT Open (phase wise) = 0 Hr 10 Min 0 sec	CT Open (phase wise) = 0 Hr 2 Min 0 sec	Ir + Iy + Ib + In ≥ 10 % of Ibasic (vector Sum) AND Phase current < 1% of Ibasic with All current positive	Ir + Iy + Ib + In < 5 % of Ibasic. (vector Sum) AND Phase current > 10% of Ibasic with All current positive	25

			CT Reversal = 0 Hr 30 Min 0 sec (CTR)	CT Reversal = 0 Hr 2 Min 0 sec	Active current negative	Active current positive AND > 2 % Ibasic	25
			Current Unbalance = 0 Hr 30 Min 0 sec (CU)	Current Unbalance = 0 Hr 2 Min 0 sec	Current difference ≥20% between phases for 100/5A (10% for 200/5A ratio) and I min 10% of Ibasic	Current difference <10% between the phases for 100/5A (5% for 200/5A)and I min>5% of Ib	25
			Low Power Factor = 0 Hr 30 Min 0 sec (LPF)	Low Power Factor = 0 Hr 2 Min 0 sec	I >1% of Ib and Power Factor ≤ 0.5 in any phase	I >1% of Ib and Power Factor ≤ 0.7 in respective phase	25
			Neutral Disturbance = 0 Hr 01 Min 0 sec (ND)	Neutral Disturbance = 0 Hr 2 Min 0 sec (ND)	Voltage >145% of Vref&Current >10% Ib OR Frequency < 47 Hz OR Frequency > 53 Hz OR DC voltage / signal/ pulse/ chopped signal injection	Voltage <115% of Vref&Current > 10% Ib AND Frequency > 47 Hz OR Frequency < 53 Hz	25
			Power On Off = 0 Hr 02 Min 0 sec	Power On Off = immediate	Actual Voltage off	Actual Voltage On	25
			Over Voltage = 0 Hr 30 Min 0 sec	Over Voltage = 0 Hr 2 Min 0 sec	Voltage > 130% of Vref	Voltage <110% of Vref	25
			Over current= 0hr 30min 0sec (OL)	Over Current = 0hr 2min 0sec	>Preset value (default value set at 120%Ib)	I<100%Ib	25
			Microwave immediate (record only 1 event on first application & only one event for next 1min)	Microwave 0 Hr 01 Min 0 sec (should restore after 1 min. of last application)	Any higher frequency magnetic waves, micro waves > 10 mT (or mutually decided)	Removal of device	25
			No Display 0 Hr 30 Min 0 sec	On restoration of display	Energy Meter power up (circuit charged) and display non functioning	Display working	5

Temperature Rise = 0 Hr 30 Min 0 sec (TR)	Temperature Rise = 0 Hr 02 Min 0 sec (TR)	Temperature >70˚C	Temperature <60˚C	25 (Stay put type)
NIC card Removed (Immediate)	NIC Card inserted (Immediate)	On removal of card	On insertion of card	20
PhSeq (Immediate)	PhSeq (Immediate)	Change of phase sequence	Restoration of phase sequence	5

Meter shall be provided with feature for terminal cover opening with time stamping.

Note: “Meter shall have neutral CT for tamper identification and analysis.”

4.5.7 Meter shall latch & store cumulative count and cumulative durations all the tampers events which have logged /occurred/stored in memory of meter from the date of energization till life of meter. Total tamper storage should be as per table 1 above.

4.5.8 The meter shall record in export registers in case of reversal of all CT terminals. The meters are to be used for registration of energy consumed by the consumer, as such the meters shall be programmed for import mode and in case of reversal of energy direction (reversal of all CT terminals) meter shall register energy separately in export mode i.e. in case of CT reversal, meter shall record scalar (not vector sum) sum of energy.

4.5.9 The meter shall register correctly if supply neutral is not available at the meter neutral terminal. The meter shall work in absence of any two incoming wires. It shall keep recording correctly in case of unbalance system voltage also as defined above.

4.5.10 The meter shall keep working accurately irrespective of the phase sequence of the supply. The meter shall be functional even if somehow change in the phase sequence takes place. Meter shall sufficiently record this event as reverse sequence.

4.5.11 An event to be provided for invalid phase association with name ‘Invalid phase association’

4.5.12 The Meter Shall be able to differentiate between actual CT reversal and condition arising out of unbalanced / unhealthy capacitor bank. The logics for the same to be provided in tender samples also.

4.5.13 The Cover Open tamper detection should be through heavy duty, sturdy two number micro switcheswith OR gate logic such that it should not log false event on vibration or impact during handling or testing.

		OEM should provide all required features as per OERC billing criteria in meter even if it is not mentioned in the specifications.
4.6	**Event compartments**	4.6.1 The event compartments shall be IS 15959 Part-1 table 9. 4.6.2 The size of the event compartments should be such that all above events (in table no.1 and other required events defined in various clauses of this documents) are accommodated in the assigned event category compartment. i.e. if in case of voltage compartment assigned to 4 number of events then the minimum size of this compartment should be such that it should accommodate sum of all maximum number of events as marked above table 1 . 4.6.3 Transaction events compartment size shall be minimum 100 events.
5	**GENERALCONSTRUCTIONS**	The Meter shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal conditions, so as to ensure especially personal safety against electric shock, safety against effect of excessive temperature, protection against spread of fire, protection against penetration of solid objects, dust and water. All parts, which are subject to corrosion under normal working conditions, shall be protected effectively. Any protective coating shall not be liable to damage by ordinary handling or damage due to exposure to air, under normal working conditions. The meters shall be designed and manufactured using SMT (Surface Mount Technology) components All the material and electronic power components used in the manufacture of the meter shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy as given below or any other equivalent make with the strict approval of TPCODL:

S No	Component Function	Requirement	Makes and Origin
1.	Measurement/ computing chips	The Measurement/ computing chips used in the meter should be with the Surface mount type along with the ASICs	USA:Anolog Devices, Cyrus Logic, Atmel, Phillips, Freescale semiconductor South Africa: SAMES Japan: NEC
2.	Memory chips/NVM	The memory chips should not be affected by the externalparameters like sparking, highvoltage spikes or electrostaticdischarges. The life of NVM shall be 15 years.	USA: Atmel, National Semiconductors, Texas Instruments, Phillips, Microchip Japan:Hitachi or Oki Swiss: STMicro
3.	Display modules	The display modules should be well protected from the external UV radiations. The display visibility	Taiwan:Holtek Singapore:Bonafied Technologies

				should be sufficient toread the meter mounted between height of 0.5m and 2m. The construction of the modulesshould be such that the displayed quantity should not disturbed with the life of display. Should be with Green LED background. It should betrans-reflective STN typeindustrial grade with extended temperature range.	Korea:Advantek China: Xiamen,Trulysemiconductor
			4.	Optical port	Optical port should be used to transfer the meter data to meter reading instrument. The mechanical construction of the port should be such to facilitate the data transfer easily. It should be magnetic locking type	USA: National Semiconductors Holland / Korea: Phillips Taiwan: MAXIM, Everlight Japan:Hitachi
			5	P.C.B.	Glass Epoxy, fire resistance grade I with minimum thickness 1.6 mm	A class consumer
			6.	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.	USA: National Semiconductors, Atmel,Phillips, Texas Instruments, Vishay Japan:Hitachi, Oki, AVX or Ricoh Korea: Samsung
			7.	Battery	Lithium with guaranteed life of 15 years	Varta / Tedirun/Vitzrocell / Sanyo or equivalent.
			8.	Micro controller and RTC having separate battery	The accuracy of RTC shall be as per relevant IEC / IS standards and RTC shall be provided with separate battery in its ckt.. The micro controller shall be of superior quality from reputed make with long life.	USA: Philips , Dallas, Atmel, Motorola Japan: NEC or Oki
			9.	Temperature sensor	Temperature sensor shall be internal to the meter and its accuracy shall be as per relevant IEC / IS standards. The OEM test report to be furnished. With good performance till life of meter.	USA: Philips , Dallas, Atmel, Motorola Japan: NEC or Oki
5.1	**Meter Body**	5.1.1 Meter body shall be made of unbreakable, high grade, fire retardant reinforced Insulating material (protective Class II) with FV0 Fire Retardant, self -extinguishing, UV stabilize, recyclable and Anti oxidation properties. 5.1.2 The minimum thickness of the meter enclosure shall be 2mm.				

		5.1.3 Meter base shall be opaque with polycarbonate LEXAN 500R or equivalent on prior approval from the TPCODL. (If different material offered the bidders should submit material data sheet in technical bid) 5.1.4 Meter cover shall be transparent with polycarbonate LEXAN 143R/943A or equivalent on prior approval from the TPCODL. (If different material offered the bidders should submit material data sheet in technical bid) **5.1.5 Meter cover & base shall be provided with continuous and seamless Ultrasonicwelding / chemical welding such that it is not opened without breaking the enclosure. Front cover & base shall be such that it is not possible to cut & open the meter without certainly damaging the meter body and by no means shall an attempt to reassemble would not leave physical evidence. The damage evidences should be visible externally& should be traceable in such a way that attempts can be proved in court of law.** 5.1.6 The meter body shall be sealed in such a way that opening of meter base and cover is possible only after breaking the seal(s). 5.1.7 During meter manufacturing the meter seal fixing should be tightened such that the seal body should be close to meter body. 5.1.8 Unidirectional screws to be used on meter covers where ever required. 5.1.9 The Meter body shall be such that the liquid or chemical shall not reach the electronic parts if liquid is injected from any side of meter body such as meter terminals, push button, display, NIC card casing etc. Necessary protection and water tight sealing to be provided at terminals and Push buttons etc.
5.2	**Terminals, Terminal Block**	5.2.1 **Terminal block should be in single mould with meter body base. (Not separate)** 5.2.2 **After any attempts the terminal block should not be able to disengaged, opened or loosen from any side.Any attempt to disengage the terminal block should certainly damage the meter body with physical evidences. The damage evidences should be visible externally& should be traceable in such a way that attempts can be proved in court of law.** 5.2.3 Terminals may be grouped in terminal block having adequate insulating properties and mechanical strength. In order to satisfy such requirements when choosing insulating materials for the terminal block adequate testing of materials shall be taken into account. 5.2.4 Terminal block and terminal cover shall be of a material which complies with the requirements of IS11731 (part 1) method FH1. The material of which the terminal block is made shall be capable of passing the Heat Deflection temperature test given in ISO 75 for temperature of 135°C and pressure of 1.8 MPa as mentioned in IS 14697. Tested as per ISO 75-2/A or ASTM D648.

		5.2.5 The terminal block shall be of opaque with polycarbonate LEXAN500R or equivalent on prior approval from the TPCODL. (If different material offered the bidders should submit material data sheet in technical bid) 5.2.6 The terminals and connections shall be suitable to carry up to 100 % of Imax continuously. The size, design & material of Busbar /Shunt/Terminal shall be with suitable cross sectional area so that temperature rise will not be more than 20 ˚C above ambient temperature of 45˚C at 100% of I max loading for 06 hrs continuous. This test of temp. rise shall be done on tender samples & will also be done on any samples from any supplied lot. 5.2.7 The terminal block, the terminal cover and the meter case shall ensure reasonable safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them. 5.2.8 The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there is no risk of loosening or undue heating. Terminal & screw should not be damaged during regular opening and tightening. 5.2.9 Internal diameter of the terminal holes shall be minimum 5 mm; minimum clearance between adjacent terminals shall be 10 mm. Minimum Depth of the terminal holes shall be of 20 mm. 5.2.10 Minimum two number of terminal screws to be provided per terminal wire. 5.2.11 Terminal block shall be such that the risk of corrosion resulting from contact with any other metal part is minimized. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material. 5.2.12 Meter terminal should have 12 pins, zig zag arrangement.The terminals should have center to center distance of 11.5mm. 5.2.13 Pin configuration shall be R-Cin, R volt, R-Cout, Y-Cin, Y volt, Y-Cout, B-Cin, B-volt, B-Cout, Neutral-in, N, N-out 5.2.14 **The preferred meter size shall be HxWxT= 235x300x120mm. Height is from the base of the terminal block. Further the bidder can check the dimensions and space availability in the existing TPCODL meter boxes at our MMG departmentfor accommodating the smart meters in same boxes and meter body design should be such that it should accommodate in existing boxes of TPCODL.**
5.3	**Terminal Cover**	5.3.1 Terminal cover shall be short type and transparent with polycarbonate LEXAN 143R/943A or equivalent on prior approval from the TPCODL. 5.3.2 Appropriate space shall be available for incoming /out going cables without damaging/stressing terminal cover (terminal cover design shall be as per the TPCODL approval). After sealing the cover, terminals shall not be accessible

		without breaking the seals. 5.3.3 The terminal cover design should be such that the sealing screw locking provision on cover should have min dimension of 3mmx3mm. (Excluding seal lock hole)
5.4	**Sealing of meter, terminal cover and NIC cover**	5.4.1 Reliable sealing arrangement shall be provided to make the meter tamper evident and to avoid fiddling or tampering by unauthorized persons. 5.4.2 For this, one no. Polycarbonate seal and three no. Hologram seal with unique serial numbers (on Left, Right & Top side) shall be provided by the bidder. 5.4.3. One no polycarbonate seal shall be provided by the TPCODL. This seal shall be fix on right hand side of meter. 5.4.4. All the seals with unique serial numbers shall be fixed on meter body by the bidder at his works before calling for inspection. 5.4.5 Two sealing provision shall be provided at meter terminal cover, such that terminal shall not be accessible without breaking the seals. All the seals shall be provided on front side only and as per the TPCODL specification. Rear side sealing arrangement shall not be accepted. Bidder shall provide seals be as per CEA regulation (2006). Only patented seals to be used as per CEA requirements. 5.4.6 The bidder shall provide TPCODL(MMG store and MTL) the soft record of polycarbonate seal and hologram seal serial number and NIC card serial number used against each meter serial number along with its position (RHS/LHS/Top/ NIC Cover) in tabular form for every lot of meter 5.4.7 Plug in type NIC card cover should have proper sealing arrangement and should be sealed with TPCODL polycarbonate seal.
5.5	**TOD Feature**	The meter shall be capable of measuring Cumulative Energy (kWh &kVAh), and MD (kW & kVA) with time of day (TOD) registers having 8 zones & 02 seasons (no. of zones & time slot shall be programmable by MRI/ Over the air with adequate security level and in one to one /broadcast mode over the air). Current TOD (during tender) to be given is as below, Slots | Time Slot | Jan-Dec Off Peak | 0000-0600 | Register 1 Normal | 0600-2400 | Register 2 **# The bidder to ask TPCODL for latest TOD timing slots before manufacturing of every lot.**

5.6	**MD Integration**	The MD integration period shall be 15 minutes (integration period-programmable by MRI at site and also thru AMR with adequate security level). The MD resetting shall be automatic at the 1st of the month i.e. 0000 hours of 1st day of the month. Manual MD reset button shall not be available. Last 6 MD values shall be stored in the memory and one to be displayed in the Auto scroll mode. MD shall be recorded and displayed with minimum three digits before decimal and minimum two digits after decimal points. MD integration shall be of sliding Type at an interval of 10 min.
5.7	**Parameters in BCS**	All these parameters shall be downloaded locally or remotely and interpreted in PC/Laptop. All the parameters shall be recorded and memorized in its Non volatile Memory (NVM). The corresponding non volatile memory shall have a minimum retention time of 10 years. Last twelve months history data (kWh &kVAh* (lag only) cumulative & TOD reading and MD(kW & kVA*(lag only) current, history& TOD) with data and time) and at least last 25 tamper events for each tamper shall be available in the non volatile Memory. Fail' to be log in memory in the following conditions only in BCS not in display a) RTC fail b) NVM memory fail c) Battery fail d) NIC card status 'High THD' to be log in memory in the following conditions only in BCS not in display e) THDV any phase higher than threshold f) THDI any phase higher than threshold *Meter shall be programed at default 'lag only' configuration i.e. Leading power factor to be treated as unity for kVA & kVAh calculations. All the parameters shall be as per actual without multiplying factor.
5.7.1	**Load survey(for pre-paid &post paid meter mode)**	The meter shall be capable of recording 15 minutes average of the following parameters for at least last 45 days a) Voltage for each phase b) Current of each phase c) Actual Neutral current d) Average PF e) Average kWh f) Average kVAh (lag only) g) kVArh(Lagging) h) kVArh(Leading) i) Demand KW j) Demand KVA k) THD Voltage phase wise l) THD Current phase wise Meter shall be capable of recording daily Energy and Demand 00:00 to 24:00 Hrs kWh/kVAh, kW/kVA in BCS for 45 days. Midnight energy value of cumulative kWh/kVAh

<table>
<tr><td></td><td></td><td>and daily consumption kWh/kVAh should be available in meter memory for last 45 days. Load survey data should be at least with 5 decimal place.</td></tr>
<tr><td>5.7.2</td><td>Instantaneous Parameters</td><td>Meter shall be capable for following Instantaneous Parameters in Memory and should be available in BCS.

<table>
<tr><td>Meter Sr.No.</td><td></td></tr>
<tr><td>Meter Type</td><td></td></tr>
<tr><td>Meter date & Time</td><td>DD MM YYYY HH MM SS</td></tr>
<tr><td>Voltage –R</td><td>000.000V</td></tr>
<tr><td>Voltage –Y</td><td>000.000V</td></tr>
<tr><td>Voltage –B</td><td>000.000V</td></tr>
<tr><td>Line Current -R</td><td>00.000A</td></tr>
<tr><td>Line Current -Y</td><td>00.000A</td></tr>
<tr><td>Line Current -B</td><td>00.000A</td></tr>
<tr><td>Actual Neutral Current</td><td>00.00A</td></tr>
<tr><td>Active Current –R</td><td>00.000A</td></tr>
<tr><td>Active Current –Y</td><td>00.000A</td></tr>
<tr><td>Active Current –B</td><td>00.000A</td></tr>
<tr><td>Reactive Current-R</td><td>00.000A</td></tr>
<tr><td>Reactive Current-Y</td><td>00.000A</td></tr>
<tr><td>Reactive Current-B</td><td>00.000A</td></tr>
<tr><td>Power factor-R</td><td>0.000</td></tr>
<tr><td>Power factor-Y</td><td>0.000</td></tr>
<tr><td>Power factor-B</td><td>0.000</td></tr>
<tr><td>Average Power factor</td><td>0.000</td></tr>
<tr><td>Instantaneous Frequency</td><td>00.000Hz</td></tr>
<tr><td>Instantaneous Load</td><td>Active ,Reactive Lag/Lead, Apparent</td></tr>
<tr><td>Present Cumulative Energy</td><td>Active ,Reactive Lag/Lead, Apparent</td></tr>
<tr><td>Cumulative Power Off Duration</td><td>00000</td></tr>
<tr><td>Cumulative Power ON Duration</td><td>00000</td></tr>
<tr><td>Cumulative Tamper count</td><td>00000</td></tr>
<tr><td>Cumulative Tamper duration</td><td>00000</td></tr>
<tr><td>Cumulative Billing Count</td><td>00000</td></tr>
<tr><td>Last Billing date</td><td>dd:mm:yy</td></tr>
<tr><td>No of Power failure</td><td>00000</td></tr>
<tr><td>Vector/phasor diagram (also showing neutral current) In case one of the voltage is missing, vector</td><td></td></tr>
</table>
</td></tr>
</table>

		should be made with 2 phase voltage and all currents.
5.7.3	**General Information**	Meter shall be capable for providing below mentioned general parameters in memory **Meter Serial number** Software Name Version Manufacture Name Manufacture Date (MM/YY) Meter Type Meter Class Meter Constant Meter Voltage Rating Meter Current Rating TOD profile showing timing and seasons # NIC Sr.no. NIC make # if any additional key is required to see this value, it should be provided without any additional cost to TPCODL.
5.7.4	**Billing Parameters**	1) Cumulative kwh, kVAh (lag only), kVArh lead, lag (all import and export) and TOD1 kWh,TOD2 kWh,,TOD1 kVAh (lag only),TOD2 kVAh (lag only),, For present and last 06 Resets (reset date for all resets/history, time zone register wise) 2) Maximum Demand Absolute Active Load and Absolute Apparent load and TOD1 kW,TOD2 kW,TOD3 kW,TOD1 kVA (lag only),TOD2 kVA (lag only), for present and last 06 Resets (reset date for all resets/history, time zone register wise) along with date and time stamp. 3) Billing Dates (6 History) 4) Cumulative Billing count 5) TOD details with day time and season wise. 6) Monthly power On/Off hours Last five modes with date & time of switching with cumulative energy parameters kWh, kVAh (lag only), kVArh lead, lag (all import and export) and TOD1 kWh,TOD2 kWh,TOD1 kVAh (lag only),TOD2 kVAh (lag only), Note : Meter must have provision of 8 time zones. Meter Should push mid night reads with all billing parameters and rising demand for KW and KVAon daily basis

5.7.5	**Transactions**	All the changes in software of meter to be logged along with date & time stamp and readings indicating the particular parameter which has been programmed. Meter should do billing if any billing related transaction is done.
5.7.6	**Tamper Events**	All events should be logged as per table no-1. The meter should not have any other event logging or any logic other than desired in specs. If any other logic is present then bidder has to disclose during tender and offering of lot and get approval for same. All other logics not mentioned in specs should be removed or disabled in meter firmware if not approved by TPCODL.
5.8	**Display units**	The display unit shall be Pin type built-in liquid crystal display (Permanently backlit type LCD). The LCD shall be of STN (Super Twisted Nematic) construction suitable for maximum temperature withstands 65˚C and minimum temperature withstands 0˚C during normal operating condition. The LCD display shall have a wide viewing angle of 120 degree. When the meter is not energized the electronic display need not be visible. The display shall not be affected by electrical, magnetic disturbances and ESD. The display should be readable in direct sunlight. **The back lit must be green in color for good visibility of digits in sunlight.** The kWh &kVAh register shall have minimum 8 digits reading LCD display and size of the digits shall be minimum 10mmx5mm. Cumulative energy (kWh &kVAh) shall be displayed without decimal in auto scroll mode. (However decimal shall be available in push button mode for high resolution display for testing). All the parameters shall be as per actual without multiplying factor.
5.8.1	**Auto Scroll mode**	Persistence time for each parameter shall be 10 second. Values followed by header shall be avoided. (I.e. if MD1 is displayed in Auto scroll mode, Header (MD1) and value (say 025.238 kW) shall be shown simultaneously; it shall not be shown in successive displays. Off time shall not be available in auto scroll mode between each cycle. Auto scroll mode is restored after 10 sec, if push button is not operated. Display should not be stuck for any tamper events. The cumulative energies shall not have any decimal value. Following shall be continuously displayed in auto scroll and push button mode in the given order;

Sr. No.	**Auto Scroll Display**
1	LCD CHECK
2	Meter Sr. No.* > Complete Meter Serial no. should be there in single shot.
3	dd:mm:yy Date
4	hh:mm:ss Time
5	C (T1+T2) kWh Current Cumulative kWh

		6	C (T1+T2) kVAh (lag only) Current Cumulative kVAh
		7	C kVArh lag Current Cumulative kVArh(lag).
		8	C kVArh lead Current Cumulative KVARh(lead).
		9	Individual cumulative kWh for T1,T2
		10	Individual cumulative kVAh (lag only) for T1,T2
		11	Current MD – kW
		12	Current MD - kVA
		13	b 1 KWh kWh reading on 1st of last month at 00.00 hrs.
		14	b 1 Individual cumulative kWh for T1,T2 for last month
		15	b 1 MD in kW on 1st of last month at 00.00 hrs.
		16	b 1 kVAh(lag only) reading on 1st of last month at 00.00 hrs.
		17	b 1 Individual cumulative kVAh (lag only) for T1,T2 for last month
		18	b 1 MD in kVA reading on 1st of last month at 00.00 hrs
		19	b 1 Avg. pf
		20	Cumulative Billing count
		21	U1 V R Phase Voltage (Instantaneous value).
		22	U2 V Y Phase Voltage (Instantaneous value).
		23	U3 V B Phase Voltage (Instantaneous value).
		24	A1 A R Phase Current (Instantaneous value).
		25	A2 A Y Phase Current (Instantaneous value).
		26	A3 A B Phase Current (Instantaneous value).
		27	Instantaneous power factor
		28	Instantaneous load in KW
		29	Instantaneous load in KVA
		30	Voltage Sequence R,Y,B
		31	Current Sequence R,Y,B

5.8.2 **Push Button Scroll mode**

Following parameters shall be displayed in Push button mode in the given order.

Sr. No.	Push Button Display
1	LCD CHECK
2	Meter Sr. No.* > Complete Meter Serial no. should be there in single shot.
3	dd:mm:yy Date
4	hh:mm:ss Time
5	C (T1+T2) kWh Current Cumulative kWh
6	C (T1+T2) kVAh (Lag only) Current Cumulative kVAh
7	C kVArh lag Current Cumulative kVArh(lag).

		8	C kVArh lead Current Cumulative kVArh(lead).
		9	Individual cumulative kWh for T1,T2
		10	Individual cumulative kVAh(Lag only) for T1,T2
		11	Current MD – kW
		12	Current MD - kVA (lag only)
		13	b 1 kWh kWh reading on 1st of last month at 00.00 hrs.
		14	b 1 Individual cumulative kWh for T1,T2 for last month
		15	b 1 MD in kW on 1st of last month at 00.00 hrs.
		16	b 1 kVAh (Lag only) reading on 1st of last month at 00.00 hrs.
		17	b 1 Individual cumulative kVAh(Lag only) for T1,T2 for last month
		18	b 1 MD in KVA on 1st of last month at 00.00 hrs
		19	b 1 Avg. pf
		20	Cumulative Billing count
		21	U1 V R Phase Voltage (Instantaneous value).
		22	U2 V Y Phase Voltage (Instantaneous value).
		23	U3 V B Phase Voltage (Instantaneous value).
		24	A1 A R Phase Current (Instantaneous value).
		25	A2 A Y Phase Current (Instantaneous value).
		26	A3 A B Phase Current (Instantaneous value).
		27	Pr PF Instantaneous power factor for individual phases R,Y,B
		28	Pr kW Instantaneous load in kW
		29	Pr kVA Instantaneous load in kVA
		30	Voltage phase sequence R, Y, B
		31	Current phase sequence R, Y, B
		32	In High resolution Cumulative kWh
		33	In High resolution Cumulative kVAh (lag only)
		34	In High resolution Cumulative kVArh Lag
		35	In High resolution Cumulative kVArh Lead
		36	MAG 00 (cumulative count)
		36a	Date of last occurrence
		36b	Time of last occurrence
		37	ESD 00 (cumulative count)
		37a	Date of last occurrence
		37b	Time of last occurrence
		38	TC OPEN 00 (cumulative count)
		38a	First occurrence date
		38b	First occurrence time

		39 | Total tamper count 0000
5.9	**Output Device**	**5.9.1** **Pulse Rate:** The meters shall have a suitable test output device. 2 nos of Red color blinking LED (marked as imp/kWh and imp/Kvarh) shall be provided in the front. This device shall be suitable for using with sensing probe used with test benches or reference standard meters. The test output device shall have constant pulse rate of (preferred value- 400) pulse / kWh & pulse/kVArh**.** Meter constant shall be indelibly printed on the name plate as imp / KWh & imp/kVArh. Meter constant shall be as per actual without multiplying factor. **5.9.2** **Communication LCD indicator-** The meter shall be provided with with suitable LCD indication for communication in progress. **5.9.3** Phase indication : Individual phases should be displayed on LCD display of meter
6.0	**NAME PLATE AND MARKING**	Meters shall have a name plate clearly visible and effectively secured against removal. The name plate data should be laser printed. The base color of Name plate shall be blue(as of TPCODL logo)Indelibly and distinctly marked with all essential particulars as per relevant standards along with the following. i. Manufacturer's name ii. Type designation iii. Number of phases and wires iv. Serial number (Meter serial number shall be laser printed on name plate instead on sticker). v. Month and Year of manufacture vi. Unit of measurement vii. Reference voltage ,frequency viii. Ref. temperature if different from 27 deg. C ix. Rated basic and maximum Current x. Meter constant (imp/kWh) xi. Meter constant (imp/kVArh) xii. 'BIS' Mark xiii. Class index of meter xiv. "Property of TPCODL" xv. Purchase Order No. & date xvi. Guarantee period. xvii. Rated frequency xviii. Sign of double square xix. Country of manufacture. xx. Firmware version for meter xxi. Category xxii. Communication Tech for WAN and NAN(with carrier frequency) xxiii. Communication Technology is IHD supported (with carrier frequency).

<table>
<tr><td></td><td></td><td>However the following shall be printed in bar code on the meter nameplate.(shall be laser printed on name plate instead of any sticker).

1) Manufacturer’s code No.(given by TPCODL)
2) Meter Sr. No
3) TPCODL Property
4) Month/Year of manufacture.

The PCB Serial number should be printed on PCB instead of sticker.
Content Format for bar code: TPCODL MMYY XXXXXXXXX(9-digit Serial no.)

Bidder should ensure that NIC provided in meters are having laser printed Sr. No., MFG date, ‘Property of TPCODL’ marked, PO date and no. (same as that of meter PO)</td></tr>
<tr><td>7.0</td><td>TESTS</td><td>All routine, acceptance & type tests shall be carried out on the meter and meter body separately in accordance with the relevant IS/IEC. All routine/acceptance tests shall be witnessed by the TPCODL/his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted in addition to the tests specified in IS/IEC.</td></tr>
<tr><td>7.1</td><td>TYPE TEST</td><td>1) All tests as defined in IS 16444 part-2 and IS 15959(Part-3):2016
2) Test against abnormal magnetic influence as per CBIP TR 325.
3) Smart meter communicability as per 15959 part-3
4) Meter shall be type tested as per BIS16444 part-2</td></tr>
<tr><td>7.2</td><td>ROUTINE TEST</td><td>1) AC High Voltage test
2) Insulation test
3) Test on limits of error
4) Test of starting current
5) Test of no load condition
6) Communication check of NIC</td></tr>
<tr><td>7.3</td><td>ACCEPTANCE TEST</td><td>1) AC High Voltage test
2) Insulation test
3) Test on limits of error with following loads

<table>
<tr><td>I max(10A)</td><td>Ib (5A)</td><td>0.1 Ib</td><td>0.02 Ib</td><td>0.05Ib</td><td>0.01Ib</td></tr>
<tr><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF</td><td>UPF</td></tr>
</table>
4) Test of meter constant
5) Test of starting current
6) Test of no load condition
7) Test of repeatability of error.
8) Test of power consumption.
9) Test for Immunity against external influencing signal as per the TPCODL specification
10) Test for Immunity against DC Immunity as per the TPCODL specification
11) Test for Immunity against Tamper conditions as per the TPCODL specification</td></tr>
</table>

		12) Error measurements with all abnormal condition along with ESD, magnet, jammer 13) Test to Influence of Harmonics 14) Supply voltage and frequency variation test 15) Testing of self diagnostic features 16) Tamper count increment and logging with date and time in meter database 17) All tests as defined in IS 15959(Part-2):2016 18) Functionality of communication module is 16444 part2 19) smart meter communicability as per provision of 28 IS 15959 (part-3) 20) Meter reading on HES demand, Scheduled meter reading from HES, remote firmware upgrade from HES and all programming request from HES to be simulated and checked during inspections. 21) Physical check of NIC and replaceable ease of the NIC module in meter & logging 22) Any other test required as per latest IS 16444, 15999 and relevant parts shall be tested during inspections.
7.4	**Special Test**	The bidder shall demonstrate the communication capability of the meter through communication modes as defined in the specification before conducting acceptance tests.
8.0	**TYPE TEST CERTIFICATE**	The bidder shall furnish the type test certificates of the meter for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ ERDA/ UL laboratory as per BIS 16444 part-2. For communication testing any national approved laboratory or international acclaimed lab or equivalent will also suffice at the discretion of TPCODL. For technical evaluation of the tender, we may consider Type test report as per IS 14697. In such case the Bidder should provide IS16444-2 compliant test report before starting of supply of meters. Type test should have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPCODL.
9.0	**PRE-DESPATCH INSPECTION**	The successful bidder shall submit four prototype samples (non-returnable) of meters with NIC for further testing and compliance as per specifications and get approval before mass manufacturing. These sample shall retained with TPCODL. Inspection may be made at any stage of manufacture at the discretion of the TPCODL of the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Equipment shall be subject to inspection by a duly authorized representative of the TPCODL. Bidder shall grant free access to the places of manufacture to TPCODL's representatives at all times when the work is in progress. Inspection by the TPCODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCODL. Following documents shall be sent along with material

		a) Pre Dispatch inspection reports b)MDCC issued by TPCODL c)Invoice in duplicate d)Packing list e)Drawings & catalogue f) Delivery Challan g)Other Documents (as applicable) Note-Photographs of packed lot clearly showing s.no of meters whose inspection call has been requestedshould be sent along with letter for inspection call. Two meters from the offered lot shall be tested for all tampers at TPCODL laboratory for compliance to anti tamper feature before MDCC. The inspectors shall free to take any two meters from offered lot for testing at our Lab. Bidder should check and ensure each meter and reset each meter for any event logged for any tamper.
10.0	**INSPECTION AFTER RECEIPT AT STORE**	The material received at TPCODL's store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Plant Engineering department.
11.0	**GUARANTEE**	Bidder shall stand guarantee towards design, materials, workmanship & quality of process / manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the TPCODL up to a period of at least 60 months from the date of commissioning or 66 months from the date of last supplies made under the contract whichever is earlier, Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Company, failing which the TPCODL will be at liberty to get it replaced/rectified at bidder's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the bidder or from the " Security cum Performance Deposit" as the case may be. Bidder shall own responsibility for all internal component with an end to end agreement with individual component manufacturer.
12.0	**PACKING**	1. Bidder shall ensure that all material covered under this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit. The material used for packing shall be environmentally friendly. Packing and transportation shall be as per IS 15707:206 clauses 9.1 and 9.2. 2. Individual meter should be packed in separate box. Routine test report (with manufacturing company logo) of the individual meter shall be kept inside each card board carton of the meter. 3. On back side of routine test certificate(RTC) the bidder shall print a picture of the meter with its small details like for consumer to know about meter or display parameters sheet.

		4. The softcopy of the routine test certificate of each meter to be provided with each lot to TPCODL, MMG stores.
13.0	**TENDER SAMPLE**	Bidders are required to manufacture 03 sample meters as per the TPCODL specification (sealed, unsealed and openable base and cover to view/test the inner circuits)and submit (non-returnable) the sample along with bid for approval. The tender sample as per IS 14697 & IS 15959 shall be acceptable for verification and other checks. The samples shall be retained at TPCODL. Following accessories to be submitted along with sample 1) Detailed manual 2) Communication cords 3) Tamper logic sheet 4) Display parameter annunciator 5) BCS and 6) Internal connection diagram. Bidder to demonstrate all communication features during sample testing.
14.0	**QUALITY CONTROL**	The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. Quality should be ensured at the following stages: • At PCB manufacturing stage, each board shall be subjected to computerized bare board testing. • At insertion stage, all components should under go computerized testing for conforming to design parameter and orientation. • Complete assembled and soldered PCB should under go functional testing using Automatic Test Equipment (ATEs). • Prior to final testing and calibration, sample meters shall be subjected to aging test (i.e. meters will be kept in ovens for 24 hours at 55 Deg. C temperature and atmospheric humidity under real-life condition at its full load current. After 24 hours meter should work satisfactorily. TPCODL's engineer or its nominated representative shall have free access to the bidder's/manufacturer's works to carry out inspections.
15.0	**MINIMUM TESTING FACILITIES**	Bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards. The bidder shall have duly calibrated Reference Standard meter of Class 0.1 accuracy or better.
16.0	**MANUFACTURING ACTIVITIES**	The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart shall be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.
17.0	**SPARES, ACCESSORIES AND TOOLS**	1. Bidder to be provide free of cost 02 nos of jig (irrespective of order lot) for retrieving data from memory of meter with every new design of meter in which previous jig is supplied cannot be used. Jig should be such that NVM can be push fit on this jig and data can be retrieve from this NVM. 2. Five (5) nos. of optical cord against each 100 meter lot pro-rata basis for retrieving the data of meter through optical port should be provided, if design

		of optical port is changed from those of previously supplied meters.
18.0	**DRAWINGS AND DOCUMENTS**	Following drawings & Documents shall be prepared based on TPCODL specifications and statutory requirements and shall be submitted with the bid: a)Completely filled-in Technical Parameters. b)General arrangement drawing of the meter c)Terminal Block dimensional drawing d)Mounting arrangement drawings. e)General description of the equipment and all components with makes and technical requirement f) Type Test Certificates g)Experience List After the award of the contract, soft copies of following drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval along with meter samples,

S. No.	Description	For Approval	For Review Information	Final Submission
1	Technical Parameters	√		√
2	General Arrangement drawings	√		√
3	Terminal block Dimensional drawings	√		√
4	Mounting arrangement drawing.	√		√
5	Manual/Catalogues		√	
6	Transport/ Shipping dimension drawing		√	√
7	QA &QC Plan	√	√	√
8	Routine, Acceptance and Type Test Certificates	√	√	√

Bidder shall subsequently provide Soft copy of all the drawing, GTP, Test certificates shall be submitted for the final approval of TPCODL.

All the documents & drawings shall be in English language.

19.0 **GUARANTEED TECHNICAL PARTICULARS**

S.No	**Description**	**Units**	**As Furnished by Bidder**
1	Type of meter		

			2	Accuracy Class of the meter		
			3	Ib& Imax	A	
			4	Operating Voltage for meter	V	
			5	Operating Frequency	*Hz*	
			6	Power Consumption and Burden		
			7	Starting Current	mA	
			8	Short time over current	A	
			9	Influence of heating		
			10	Rated impulse withstand voltage	KV	
			11	AC withstand Voltage for 1 min	KV	
			12	Insulation resistance a) Between frame &Current, voltage circuits connected together: b) Between each current(or voltage circuit) & eachand every other circuit.	M ohm	
			13	Mechanical requirement as per IS 14697 and IS 16444 part 2		
			14	Resistance to heat and fire (As per specification)		
			15	Degree of protection		
			16	Resistance against climatic influence (as per IS 14697 and IS 16444 part-2)		
			17	Electromagnetic Compatibility (EMC)		
			18	Accuracy requirements (As per IS 14697and IS 16444 part-2		
			19	Power factor range		
			20	Energy measurement		
			21	Connection Diagram for system on terminal cover	Yes/No	
			22	Self diagnostic feature		
			23	Initial start up of meter (meter shall be fully functional within 5 sec after reference voltage is applied to the meter terminals)		

			24	Terminal block a)Depth of the Terminal holes b)Internal diameter of terminal holes c) Clearance between adjacent terminals	 Mm Mm Mm	
			25	Communication capabilities as per clause 4.2		
			26	Immunity against abnormal Magnetic influence, as defined in Cl. 4.3		
			27	Immunity against HV ESD as defined in Cl. 4.3		
			28	DC Immunity as defined in Cl. 4.4		
			29	Abnormal and tamper events and logging with snapshot in all conditions as per table no-1 cl. 4.5	Yes/no	
			30	Grade/Name of material for a) Meter base b) Meter cover c) Terminal block d) Terminal cover		
			31	Tamper counters		
			32	Recording forward energy in all conditions.	Yes/No	
			33	Meter sealing as per clause 5.4	Yes/No	
			34	Non Volatile memory (Retention period)		
			35	Measuring elements used in the meter		
			36	Power supply to circuit in case of supply failure		
			37	Display of measured values (As per specification –clause 5.8)	Yes/No	
			38	LCD display (Type and viewing angle)		
			39	Pulse rate	Imp/kWh, Imp/kVArh	
			40	Name plate marking	Yes/No	

			41	Routine test certificates	Yes/No		
			42	Acceptance test certificates	Yes/No		
			43	Type test certificates	Yes/No		
			44	Guarantee certificates	Yes/No		
			45	Output device(LEDs) As per Cl.5.9	Yes/No		
			46	Terminal Screw dia.			
			47	Ultrasonic welding of cover and base			
			48	Fire retardant categoryof the material a. Meter body b. Terminal block			
			49	Supply of Zig for retrieval of the damaged/burnt meter data at MTL, Rohini			
			50	The meter should not have any other event logging than desired in specs. All the other logics should be removed or disabled in firmware.			
			51	Meter shall be programed at default 'lag only' configuration i.e. Leading power factor to be treated as unity for kVA&kVAh calculations			
			52	Dimensions of the meter HxLxT			
			53	The terminal block arrangement in single row and with 12pin zig zag configuration			
			54	The meter design ensures that no MF required for any parameter or energy calculation and Meter constant.			
			55	Offered CT ratio's 100/5A, 200/5A			
			56	NIC module with cover & sealing arrangement provided.			

57	Harmonics Recording- The recording of harmonics up to 20th harmonic Average THD of all phase for voltage THD and current THD.		
58	Accuracy of harmonics recording		
59	Flag in BCS for high THD in any phase V or I		

B. **Electronics parts**

S No	Component Function	Requirement	Makes and Origin
1.	Measurement/ computing chips	The Measurement/ computing chips used in the meter should be with the Surface mount type along with the ASICs	
2.	Memory chips/NVM	The memory chips should not be affected by the externalparameters like sparking, highvoltage spikes or electrostaticdischarges. The life of NVM shall be 15 years.	
3.	Display modules	The display modules should be well protected from the external UV radiations. The display visibility should be sufficient toread the meter mounted between height of 0.5m and 2m. The construction of the modulesshould be such that the displayed quantity should not disturbed with the life of display. Should be with Green LED background. It should betrans-reflective STN typeindustrial grade with extended temperature range.	
4.	Optical port	Optical port should be used to transfer the meter data to meter reading instrument. The mechanical construction of the port should be such to facilitate the data transfer easily. It should be magnetic locking type	
5	P.C.B.	Glass Epoxy, fire resistance grade I with minimum thickness 1.6 mm	

			6.	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.		
			7.	Battery	Lithium with guaranteed life of 15 years		
			8.	Micro controller and RTC having separate battery	The accuracy of RTC shall be as per relevant IEC / IS standards and RTC shall be provided with separate battery in its ckt.. The micro controller shall be of superior quality from reputed make with long life.		
			9.	Temperature sensor	Temperature sensor shall be internal to the meter and its accuracy shall be as per relevant IEC / IS standards. The OEM test report to be furnished. With good performance till life of meter.		

ANNEXURE-II

PART-A/ LOT- 4 & 5

TECHNICAL SPECIFICATION FOR

TWO YEAR RATE CONTRACT FOR

SUPPLY OF

THREE PHASE 11KV/110V HTTV SMART ENERGY METER

&

THREE PHASE 33KV/110V HTTV SMART ENERGY METER

UNDER SMART METERING PROJECT

Tender Enquiry No.

TPCODL/ P&S/ 167 (Part-A/ Lot-4)/ 2020-21

TPCODL/ P&S/ 167 (Part-A/ Lot-5)/ 2020-21

CONTENTS

1	**SCOPE**	This specification covers the technical requirements of design, manufacturing, testing at meter manufacturer's works ,packing, forwarding, supply and unloading at store/site of Three Phase Four Wire, HT (CT and VT operated) AC Static Smart Meters of accuracy class 0.5s (here after referred as meters) complete with all accessories for efficient and trouble free operation with communication module (NIC) compatible with 4G and fall back to 2G technology. It is not the intent to specify completely herein all the details of tech design and construction of material. However, the material shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in manner acceptable to the TPCODL, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered material shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.
2	**APPLICABLE STANDARDS**	

a.	IS 16444 part 2: 2017	A.C. Static Transformer operated watt hour and VAR-hour meters, class 0.2s, 0.5s & 1.0S (Smart Meters)
b.	IS15959 Part3: 2017	Data exchange for electricity meter reading, tariff and load control
c.	IS 14697	A.C. Static Transformer operated watt hour and VAR-hour meters, class 0.2s, 0.5s & 1.0S
d.	IEC 60687 (1992-06)	AC Static Watthour Meters for active energy (class 0.2s and 0.5s)
e.	IS 9000	Basic Environmental testing procedure for electrical and electronic items.
f.	IS 12346: 1999	Testing Equipment For Ac Electrical Energy Meters
g.	IS 11000	Fire Hazard Testing
h.	IEC 62052 Part 11 : 2003	Electricity metering equipment (AC) - General requirements , tests and test conditions – metering equipment
i.	IEC 62053 Part 22: 2003	Electricity metering equipment (a.c.) - Particular Requirements - Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)
j.	IS 15707: 2006	Testing Evaluation installation and maintenance of AC Electricity Meters- Code of practice.
k.	IEC 60068	Environmental testing.
l.	CBIP–TR No.325	Specification for A.C. Static Electrical Energy Meters (latest amendment)
m.	CEA Regulation (2019)	Installation and operation of meters
n.	IS 60529	Degree of protection provided by enclosure
o.	IEC 62056-61	Electricity metering- Object Identification system (OBIS)
p.	ASTM D648	Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
q.	IS 11731-1	Methods of test for determination of the flammability of solid electrical insulating materials when exposed to an igniting source, Part 1: Horizontal specimen method
r.	IS 11731-2	Methods of Test for Determination of Flammability of Solid Electrical Insulating Materials When Exposed to An Igniting Source, Part 2: Vertical Specimen Method
s.	ISO 75 Part 1&2	Determination of temperature of deflection under load

3	CLIMATE CONDITIONS OF THE INSTALLATION	a) Max. Ambient Temperature : 50 deg.C b) Max. Daily average ambient temp. : 40 deg.C c) Min Ambient Temp : 0 deg C d) Maximum Humidity : 95% e) Minimum Humidity : 10% f) Average No. of thunderstorm days per annum : 50 g) Maximum Annual Rainfall : 750 mm h) Average No. of rainy days per annum : 60 i) Rainy months : June to Oct. j) Altitude above MSL not exceeding : 300 meters k) Wind Pressure : 126 kg/sq m up to an elevation at 10 m. The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1 g

4	GENERAL TECHNICAL REQUIREMNTS			
		SNO	DESCRIPTION	REQUIREMENT
		4.01	Type of the meter	Three Phase Four Wire, AC Static Current Transformer (CT) and Voltage Transformer (VT) operated Watthour and Var-hour Smart Meter. It consists of measuring elements(s), time of use of register(s) and display and plug in type bi-directional communication module all integral within the meter housing. The meter design shall be such that only CT MF is required for energy calculation.CT /PT Ratio-programmable
		4.02	Accuracy Class of the meter	1. Active Energy Measurement, a. For 11kV - 0.5s b. For 33kV-- 0.5s
		4.03	Basic Current (Ib) & rated Maximum Current (Imax)	a. For 11kV – Ib = 5A; Imax= 10 Amps (Balanced and Unbalanced Load) b. For 33KV – Ib shall be either 5A or 1A (shall be defined) When Ib= 1A; Imax= 2 Amps (Balanced and Unbalanced Load) c. Imax-200% of Ib
		4.04	Reference conditions for testing the performance of the meter	Vref = 63.5 V (phase to neutral) Frequency = 50Hz Temperature= 27^0C
		4.05	Operating Voltage	Meter shall be operational with required accuracy from 0.6 Vref to 1.2 Vref, however meter shall withstand the maximum system voltage of 110V between phase and neutral (for minimum 5 min).
		4.06	Operating Frequency	50 Hz± 5%.
		4.07	Power Consumption	Voltage circuit: Maximum 5W and 15 VA Current Circuit :Maximum 1VA (The additional power requirement during data transmission shall not exceed 7W as mentioned in IS 16444 part-2 whichever is lower, per communication module)
		4.08	Starting Current	0.1% of Ib – (5mA for Ib 5A)

		4.09	Short time over Current	20 times of Imax for 0.5sec
		4.10	Influence of heating	Temperature rise at any point of the external surface of the meter shall not exceed by more than 20K with an ambient temperature at 45^0 C.
		4.11	Rated Impulse withstand voltage	6 kV (shall be applied ten times with one polarity and then repeated with the other polarity and minimum time between each impulse to be 3 sec)
		4.12	AC withstand Voltage for 1 min	4 kV
		4.13	Minimum Insulation resistance at test voltage 500+/- 50 V dc a)Between frame & current ,voltage circuits as well as auxiliary circuits connected together: b)Between each current (or voltage circuit) & each and every other circuit:	a) 5 M ohm b) 50 M ohm.
		4.14	Mechanical requirements	Meter shall be in compliance with clause 12.3 of IS 14697& IS16444 part 2
		4.15	Resistance to heat and fire	The terminal block and Meter case shall ensure safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per clause 6.8 of IS 14697. Fire retardant material shall be used.
		4.16	Protection against penetration of dust and water.	Degree of protection: IP 51 as per IS 12063/60529, but Without suction in the meter. Meter shall comply with clause 6.9 and 12.5 of IS 14697
		4.17	Resistance against Climatic influence.	Meter shall be in compliance with clause 12.6 of IS 14697.
		4.18	Electromagnetic Compatibility (EMC)	Meter shall be in compliance with clause CBIP report 325 and IS
		4.19	Accuracy requirements	Meter shall be in compliance with clause 11 of IS14697 & IS16444 part-2
		4.20	Power factor range	Zero lag to Zero lead. Meter shall be programed at default Lag only configuration i.e. Lead to be treated as unity for kVA & kVAh calculations'
		4.21	Energy measurement	Fundamental energy +Energy due to Harmonics
		4.22	Connection Diagram	The connection diagram for the system shall be provided on terminal cover.
		4.23	Self-Diagnostic feature	The meter shall have logging with date and time in memory for un satisfactory / non-functioning of 1. Real Time Clock 2. RTC battery 3. Non Volatile Memory 4. Status of NIC (installed/ discovered/ normal)/ Signal Strength

		4.24	Initial start-up of meter	Meter shall be fully functional within 5 sec after reference voltage is applied to the meter terminals (as per clause 11.4.1 of IS 14697).
		4.25	Alternate mode of supply to the meters	In case of meter power failure, reading/data should be retrieved with the help of battery or other power source.
		4.26	Internal diameter of the terminal holes: Depth of the terminal holes:	5 mm (minimum) 20 mm (minimum)
		4.27	Clearance between adjacent terminals	10 mm (minimum)
		4.28	Display	Backlit LCD, Scrolling, 10 seconds for each parameter minimum 8 digits for reading LCD display
		4.29	Security feature	Programmable facility to restrict the access to the information recorded at different security level such as read communication, write communication, firmware selection from remote etc.
		4.31	Software and communication compatibility	The bidder shall supply software required for local HHU & remote (AMI) connectivity including required training to use the software free of cost. If this software can be used in a device readily available in market and can connect to meter through optical port or other communication port without any security checks or with MR securities which OEM will provide; then, OEM can provide only software, else the device on which this software will run is also to be provided along with technical specification of this device.
		4.32	Calibration	Meters shall be software calibrated at factory and modifications in calibration shall not be possible at site by any means. There shall be provision for firmware update to change payment mode from Prepaid to Postpaid and vice versa; similarly for metering mode from Import only to Export-Import (NET mode) and vice versa, through proper authentication process remotely over the air (OTA). The change should be recorded as Transaction Event. Billing should be done at that time of firmware upgrade so that readings at which this upgrade has happened are logged in meter and system.
		4.33	Usage Application	Indoor
		4.34	Ultrasonic welding / Chemical Bonding	Meter cover and body should be continuous and seamless ultrasonically welded with an overlapping of 5 mm (min.) or should be seamlessly chemically bonded, so that meter should not open without leaving clear mark.

		4.35	Communication module of meter for AMI	As per clause no 1.4 (b) of IS 16444 part-2. Meter should have provision of communication module compatible with both the variant mentioned in IS 16444 part-2. This module should be able to get connected to the NAN / WAN network of service provider (4G). Meter should be able to provide required power supply to NIC card provided by communication provider .
		4.36	Communication Layer Protocol	Should be as per clause 8.3 of IS 16444 part 2
		4.37	Key Management and Security Feature	Should be as per IS 15959 part 2 and 3
		4.38	Harmonics recording	The meter should record the current and voltage THD. The meter should record harmonics up to 20th harmonic Average THD of all phase for voltage THD and current THD. THD values shall have 30/15 minutes (as applicable) integration period in load survey. Accuracy of harmonics recording shall be as per meter accuracy class. The meter shall generate a flag whenever the threshold (user configurable) of the 5% THD of the load current and voltage is breached.
		4.39	The terminal pin arrangement	The terminal pin shall be 10 pin Zigzag arrangement with phase voltage terminal in between current terminals as mentioned in clause no. 5.2.11
4.1	**NIC MODULE DETAILS & INTEGRATION**	With the service providers offering 4G services, TPCODL intends to leverage 4G as the primary communication technology with hot swappable 2G Interface Card as a fall back for meter data acquisition. a) The Network Interface Card for 4G shall be modular and pluggable. The NIC shall be interoperable for service provider b) NIC card shall support remote Device Management Capability such as Reset, Configuration, Log Check, Ping, and over the air Firmware upgrade c) NIC shall support two-way communications between smart meter & head-end system such as data exchange, configuration parameters exchange, alarms, operational commands, firmware upgrade of the meter as defined in IS16444 and IS15959. d) NIC shall support push services, alarms services of the smart meter as defined in IS16444 and IS15959. e) 4G NIC card shall support communication protocols as prescribed by 4G HES supplier. f) NIC shall also support on-demand / schedule reading, time sync, configuration and over the air firmware upgrade from the head-end system. g) NIC shall have persistent network connectivity throughout as defined by 4G standards. It shall support self-configuring features. h) NIC shall operate 24*7 and shall recover from any deadlock situation immediately in the field. i) Support for possibility for provision of a unique certificate/key in each card for mutual authentication with the HES from security point of view. j) NIC shall support standard security protocols. k) NIC shall be compliant with cyber security norms. l) NIC shall register with network i.e. login and logout of each terminal to the HES. It			

		shall be recognized in the HESas authorized node. m) Attributes such as Firmware version, Hardware version, Signal strength values, packet error rate, should be pushed periodically to HES for effective communication management. n) Data must be encrypted with AES-256 bit. o) LED indication for System, Power ON indicator. p) Colour coded LED (a) For latching on to the network (b) For latched on to the network (c) For data flow indication. q) Meter display should have provision for showing if NIC card if : 1. Installed, 2. Getting Network, 3. Latched with HES, 4. Communicating with HES
4.2	**Communication capabilities and software feasibilities**	4.3.1 The meter shall have facilities for data transfer locally through Meter Reading Instrument (MRI) (Using optical port/NIC card) and remotely by 4G with proper security via Plug in type NIC. Data transfer locally through optical port via MRI is desired along with data transfer through NIC card. The data downloaded in MRI/hand held device shall be integrated to HES data base. 4.3.2 It should be the responsibility of the bidder to ensure integration of meter into HES. For cellular fallback, the Module should have backward compatibility. The fall back provision shall be taken through optical port with external modem by TPCODL. Meter should be capable for sending all data from 4G NIC and optical port. 4.3.3 It shall be possible to reconfigure the meters for RTC,TOD slots reprogramming, DIP (Demand Integration period), billing date ,display parameters etc. through proper authentication process locally through MRI and remotely over the air (OTA). Meter data should remain intact with timings. And billing should be done whenever any above mentioned attribute is changed. The change should be recorded as upgrade event. 4.3.4 Necessary keys if required for performing this reconfiguration operation should also be provided along with supply of meter lot & training to TPCODL staff on how to use it free of cost. Bidder to provide this support on a later stage also on the request of TPCODL without any cost implication. 4.3.5 Optical Communication port shall be available for communication. Communication ports shall not be affected by any type of injection /unauthenticated signals and having proper sealing arrangement. The complete data shall be downloaded within 5 minutes OTA. 4.3.6 Bidder to ensure integration of meter data with head end for data transfer as mentioned in specification. TPCODL reserves the right that if required, TPCODL will hand over the SIM cards to OEM and supply will be accepted with SIM cards already installed and with communication already tested in 100 % meters. For this purpose, TPCODL HES will be used for confirming data availability. 4.3.7 Meter should be supplied to TPCODL along with integrated NIC card. NIC card should be plug in type with proper sealing arrangement. 4.3.8 The bidder shall supply software required for local (MRI) & remote (AMI) connectivity including required training to use the software free of cost. Bidder shall provide the communication protocol / APIs for communication with meter through local (MRI) / remote (AMI) as and when required by TPCODL free of cost during life time of meter. The bidder should provide DLMS compliance for Communication with the meter at Optical port and at HES. 4.3.9 Bidder should also provide software for changing/upgrading meter firmware in

		mass and should support integration of this software with HES. Bidder should also provide base computer software (BCS) for viewing the data downloaded through HES/MRI/laptop/HHU in separate PC/laptop. Android based or windows based HHU shall be preferred. 4.3.10 For purpose of exercising control, like outage management, the meter should send abnormalities at the consumers' end like Power failure (Last Gasp) instantly, Power Restoration (First Breath) as event. Additional exceptional events should also be communicated to HES by meter immediately after the occurrence through 4G / 4G Mesh. It should also indicate the restoration of the same event. 4.3.11 List of events to be reported should be configurable over the air(OTA).The meter should have "Last Gasp" and “First Breath” feature to facilitate sending alerts to the HES during fully powered off / On condition. 4.3.12 If there are 2 requests given for communication one from HES and other from local device, request from local device should supersede. 4.3.13 Last mile mesh network must support auto-registration and self-healing feature to continue operation using easiest possible available route in case of failure of any communication device in the mesh. Self-registrations in first communication. 4.3.14 Meter Serial no will be used for tagging of all data of the meters in all database (at HES / MDM/ DCU level etc). However, it will be the responsibility of the Bidder to establish the complete communication solution involving all the meters in the system. Also, the Bidder must ensure that, the mode of communication used for 4G shall be consistent with the Government of India stipulations. Bidder should come out with it requirements for integration of meter with HES and MDMS clearly during tender submission. 4.3.15 The Bidder's supplied meter with third party communication module should have suitable hand-shaking features to allow a third-party MDMS (procured by TPCODL) to configure, command, read and control smart meters installed at site. The Bidder shall extend all necessary assistance in developing the adaptor software through a third-party for facilitating the above. 4.3.16 Integration of meter software’s with HES / MDMS for seamless transfer of data will also be in scope of bidder till the expiry of warranty of the meters. It is desired meter firmware up gradation/selection should be available over the air. Meter should be able to change to prepaid mode if required with firmware upgrade. The required firmware and any required support for integration with HES shall be provided free of cost till the useful life of the meter. 4.3.17 Communication of the meter at optical port /OTA (NAN/WAN) should be as per IS 15959 (Part-2):2016. The optical port should be with proper lockable mechanism 4.3.18 Communication NIC/network should be immune with any external Magnetic field/ESD/Jammer/HV voltage influence such that it shall not affect the normal overall functionality. 4.3.19 Meter once powered up with NIC card should be self-detected by 4G network and its basic name plate details & current readings are transferred to HES. 4.3.20 The required OBIS codes will be finalized with successful bidder. The bidder can offer desired codes from Blue Book ensuing the codes reserved or standardized

		by Bureau of Indian standards. The reserved codes in BIS are to be used/utilized as per guidelines of BIS and remaining codes from blue book can be used for communication of additional features mentioned in this specifications. This is to be done strictly with written approval from TPCODL after verification of proposed codes by manufacturer. In future if BIS adds any OBIS codes then the bidders to provide upgraded firmware with desired changes after in consultation and approval of TPCODL competent authority. 4.3.21 Meter display should have provision for showing if NIC card if : 1. Installed, 2. Getting Network, 3. Latched with HES, 4. Communicating with HES 4.3.22 If any tamper occurs in power off situation, it should be pushed as soon as the meter is powered on. 4.3.23 Bidder to provide facility for Up-gradation / Modification of Firmware 4.3.24 Following parameters may be updated multiple times during life cycle of meters over the air : Post Paid to Prepaid mode and vice versa Import mode to export Mode and vice versa. Accordingly Display parameters shall be updated remotely.
4.3	**Immunity against external influencing signals**	**4.3.1 Magnetic Field:** Meter shall record accurate energy in case of any external influencing signals in line with IS 14697:1999 Cl.11.2 and variation in limits of error (up to 100% Imax) shall be as per the table 13 of IS 14697. Meter shall be immune to any magnetic field such that it shall not affect the normal overall functionality However, in case of abnormal magnetic field as defined below meter shall perform as per the following actions: a. Meter shall log the event in its memory as" Magnet" with date and time stamp along with snapshot and the event logging threshold values as per table no. 1 in 4.5 b. The energy recording to shift on I max, Vref. with UPF. **Abnormal Magnetic field is defined as below:** a. Continuous DC magnetic induction: **>**0.20 Tesla ± 5% (Value of the magneto motive force to be applied shall be generally >10000 AT. b. AC magnetic induction: **>**10 milli Tesla (if produced with circular metal core with square cross section as specified in CBIP latest report with 2800 AT) **c.** Permanent Magnet: Immune up to 0.5T and Event logging **>**0.5T. **4.3.2 Electrostatic Discharge (ESD)** Meter shall be immune up to 50 kV and shall record accurate energy as per IS-14697:1999/CBIP-325. Meter shall log the event into memory as 'ESD' with date & time stamp for any ESD greater than 50 kV with snap shot, the event logging threshold values as per table no. 1 in 4.5. 4.3.3 The shielding around the meter shall be such that it does not get affected by high Voltage and high energy or low energy impulse when comes in contact with meter from any side. 4.3.4 Meter should immune to high/low frequency jammer devices. Meter shall log the event in its memory as" JAMMER" with date and time stamp along with snapshot, the threshold values as per table no. 1 in 4.5. 4.3.5 The meter should be immune or log the tamper on application of any other higher magnetic field of any frequency waves, micro waves like magnetron etc. the threshold values as per table no. 1 in 4.5.

4.4	**Neutral Disturbance & other tampers**	4.4.1	The meter shall log the event in memory on thresholds defined in table 1 in 4.5
		4.4.2	The meter shall not saturate on passage of direct current, which can cause the meter either to stop recording/ record inaccurately. DC injection shall be tested both in phase and neutral. Measurement by meter shall not get influenced by injection of Chopped signal/ DC signal/ DC pulse up to 330V (both + & - DC) and for any value beyond this, of any low frequency and harmonics. Meter shall log the event into memory as 'Neutral Disturbance' with date & time stamp the thresholds are as per table no. 1 in clause 4.5 below.
4.5	**Abnormal Tamper conditions**	4.5.1	The meter shall record forward energy under all abnormal tampering conditions and shall be capable of recording occurrence and restoration of abnormal events listed in table no. 1 below along with date & time and snap shots of individual voltages, currents, power factors, active energy and apparent energy at the time of occurrence of abnormal event and restoration of normal supply.
		4.5.2	For all tamper events the time stamp and snapshot parameters shall be recorded at the start time of event for occurrence (T1) and for restoration the time stamp and snapshot parameters shall be recorded at the end time of the event (T3).
		4.5.3	During abnormal & tamper conditions, the current shall be recorded as active current and line current. Each such event shall be provided with minimum count of as per table no.1 to avoid missing of data amidst usual events (like power failure) due to the limitation of FIFO. Persistence time for occurrence and restoration for the events along with their threshold values shall be as per table no. 1 given below.
		4.5.4	Multiple occurrences of same event, with different time stamps should not be logged without restoration of first occurrence, except for the case of Top Cover Open.
		4.5.5	All tamper/event logging thresholds values shall be configurable remotely over the air (OTA).

Table No.1

Persistence Time for Occurrences	Persistence Time for Restoration	Threshold Value for Occurrence of Events	Threshold Value for Restoration of Events	Compartment Size
ESD/JAMMER = immediate (record only 1 event on first application & only one event for next 1min) (ESD)	ESD/JAMMER = 0 Hr 01 Min 0 sec (ESD) (should restore after 1 min. of last application)	Immunity up to 50 KV with NIC and logging of event >50 KV	Removal of ESD/JAMMER signal	25
Magnet = 0 Hr 2 Min 0 sec (MAGNET/MAG)	Magnet = 0 Hr 2 Min 0 sec (MAGNET/MAG)	> 0.5 Tesla for permanent magnet OR DC magnetic induction > 0.2T OR AC magnetic induction > 10 mT (of any frequency)	< 0.5 Tesla for permanent magnet OR DC magnetic induction < 0.2T or AC magnetic induction <10 mT	25

		Meter Top Cover Open (TC Open) immediate	Meter Top Cover Open (TC Open) Immediate	If meter top cover is opened	NA	05 (Stay put Type)
		Potential Missing = 0 Hr 10 Min 0 sec (PM)	Potential Missing = 0 Hr 2 Min 0 sec	Voltage < 70% of Vref AND current > 2% Ibasic	Voltage > 80% of Vref AND current > 2% Ibasic	25
		Voltage Unbalance = 0 Hr 30 Min 0 sec (VU)	Voltage Unbalance = 0 Hr 2 Min 0 sec	20% or more between the phases and current > 2% Ibasic	Shall be less than 10 % between the phases and current > 2% Ibasic	25
		CT Open (phase wise) = 0 Hr 10 Min 0 sec	CT Open (phase wise) = 0 Hr 2 Min 0 sec	Phase Current < 1% of Ibasic AND Current on other phases > 10% of Ibasic with all current positive	Phase Current > 10% of Ibasic with all current positive	25
		CT Reversal = 0 Hr 30 Min 0 sec (CTR)	CT Reversal = 0 Hr 2 Min 0 sec	Active Current negative	Active Current positive AND > 2 % Ibasic	25
		Invalid Phase Association	Invalid Phase Association (Immediate)	Incorrect Phase connections (logic to be provided by bidder)	Correct Phase Connections (logic to be provided by bidder)	5
		Current Unbalance = 0 Hr 30 Min 0 sec (CU)	Current Unbalance = 0 Hr 2 Min 0 sec	Current difference $\geq$ 10% between phases and Imin 10% of Ibasic	Current difference < 5% between the phases and Imin >5% of Ib	25
		Low Power Factor = 0 Hr 30 Min 0 sec (LPF)	Low Power Factor = 0 Hr 2 Min 0 sec	I >1% of Ib and Power Factor ≤ 0.5 in any phase	I >1% of Ib and Power Factor ≤ 0.7 in respective phase	25
		Neutral Disturbance = 0 Hr 01 Min 0 sec (ND)	Neutral Disturbance = 0 Hr 2 Min 0 sec (ND)	Voltage >145% of Vref & Current >10% Ib OR Frequency < 47 Hz OR Frequency > 53 Hz OR DC voltage / signal/ pulse/ chopped signal injection	Voltage <115% of Vref & Current > 10% Ib AND Frequency > 47 Hz OR Frequency < 53 Hz	25
		Power On Off = 0 Hr 02 Min 0 sec	Power On Off = immediate	Actual Voltage off	Actual Voltage On	25
		Over Voltage = 0 Hr 30 Min 0 sec	Over Voltage = 0 Hr 2 Min 0 sec	Voltage > 130% of Vref	Voltage <110% of Vref	25

		Over current = 0hr 30min 0sec (OL)	Over Current = 0hr 2min 0sec	>Preset value (default value set at 120%Ib)	I<100%Ib	25
		Microwave immediate (record only 1 event on first application & only one event for next 1min)	Microwave 0 Hr 01 Min 0 sec (should restore after 1 min. of last application)	Any higher frequency magnetic waves, micro waves > 10 mT (or mutually decided)	Removal of device	25
		NIC card Removed (Immediate)	NIC Card inserted (Immediate)	On removal of card	On insertion of card	20
		Meter shall be provided with feature for terminal cover opening with time stamping. 4.5.6 Meter shall latch & store cumulative counts of all the tampers events which have logged /occurred/stored in memory of meter from the date of energization till life of meter. Total tamper storage should be as per table 1 above. 4.5.7 The meters are to be used for registration of energy consumed by the consumer, as such the meters shall be programmed for import mode and in case of reversal of energy direction (reversal of all CT terminals) meter shall register energy separately in export mode i.e. in case of CT reversal, meter shall record scalar (not vector sum) sum of energy. The meter shall accurately distinguish between actual CT reversal and condition due to faulty reactive power compensation devices/ capacitor banks. Appropriate logics for the same shall be provided in meter 4.5.8 The meter shall register correctly if supply neutral is not available at the meter neutral terminal. The meter shall work in absence of any two incoming wires. It shall keep recording correctly in case of unbalance system voltage also as defined above. 4.5.9 The meter shall keep working accurately irrespective of the phase sequence of the supply. The meter shall be functional even if somehow change in the phase sequence takes place. 4.5.10 The Cover Open tamper detection should be through heavy duty, sturdy micro switches with OR gate logic such that it should not log false event on vibration or impact during handling or testing. 4.5.11 OEM should provide all required features as per OERC billing criteria in meter even if it is not mentioned in the specifications.				
4.6	**Event Compartments**	4.6.1 For event compartments IS 15959 Part-3 shall be referred. 4.6.2 The size of the event compartments should be such that all above events (in table no.1 and other required events defined in various clauses of this documents) are accommodated in the assigned event category compartment. i.e. if in case of voltage compartment assigned to 4 number of events then the minimum size of this compartment should be such that it should accommodate sum of all maximum number of events as marked above table 1 . **4.6.3** Transaction events compartment size shall be minimum 20 events.				

5 GENERALCONSTRUCTIONS

The Meter shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal conditions, so as to ensure especially personal safety against electric shock, safety against effect of excessive temperature, protection against spread of fire, protection against penetration of solid objects, dust and water.

All parts, which are subject to corrosion under normal working conditions, shall be protected effectively. Any protective coating shall not be liable to damage by ordinary handling or damage due to exposure to air, under normal working conditions. The meters shall be designed and manufactured using SMT (Surface Mount Technology) components. All the material and electronic power components used in the manufacture of the meter shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy as given below or any other equivalent make with the strict approval of TPCODL

SNo	Component Function	Requirement	Makes and Origin
1	Measurement/computing chips	The Measurement/ computing chips used in the meter should be with the Surface mount type along with the ASICs	USA: Analog Devices, Cyrus Logic, Atmel, Phillips, Free scale semiconductor, Texas Instruments, South Africa: SAMES, Japan: NEC
2	Memory chips/NVM	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges. The life of NVM shall be 15 years.	USA: Atmel, National, Semiconductors, Texas Instruments, Phillips, Microchip, Japan: Hitachi or Oki, Swiss: STMicro
3	Display modules	The display modules should be well protected from the external UV radiations. The display visibility should be sufficient to read the meter mounted between height of 0.5m and 2m. The construction of the modules should be such that the displayed quantity should not disturbed with the life of display. Should be with Green LED background. It should be trans-reflective STN type industrial grade with extended temperature range.	Taiwan: Holtek, Singapore: Bonafied, Technologies, Korea: Advantek, China: Xiamen, Truly semiconductor
4	Optical port	Optical port should be used to transfer the meter data to meter reading instrument. The mechanical construction of the port should be such to facilitate the data transfer easily. It should be magnetic locking type	USA: National, Semiconductors, Holland / Korea: Phillips, Taiwan: MAXIM, Everlight, Japan: Hitachi
5	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	A class consumer
6	Electronic components	The active & passive components should be of the surface mount type & are to be handled & soldered by	USA: National, Semiconductors, Atmel, Phillips,

				the state of art assembly processes.	Texas, Instruments, Vishay, Japan: Hitachi, Oki, AVX or Ricoh, Korea: Samsung,
		7	Battery	Lithium-ion battery with guaranteed life of 15 years	Varta / Tedirun / Vitzrocell / Sanyo or equivalent.
		8	Microcontroller and RTC having separate battery	The accuracy of RTC shall be as per relevant IEC / IS standards and RTC shall be provided with separate battery in its circuit. The micro controller shall be of superior quality from reputed make with long life.	USA: Philips , Dallas, Atmel, Motorola, Texas Instruments, Japan: Renesas, NEC or Oki

5.1	**Meter Body**	5.1.1	Meter body shall be made of unbreakable, high grade, fire retardant reinforced Insulating virgin material (protective Class II) with FV0 Fire Retardant, self - extinguishing, UV stabilize, recyclable and Anti oxidation properties.
		5.1.2	The minimum thickness of the meter enclosure shall be 2mm.
		5.1.3	Meter base shall be opaque with virgin polycarbonate LEXAN 500R or equivalent (i.e. chart of Lexan 500R compared with the alternative material) on prior approval from the TPCODL. (If different material offered the bidders should submit material data sheet in technical bid)
		5.1.4	Meter cover shall be transparent with virgin polycarbonate LEXAN 143R/943A or equivalent (i.e. chart of Lexan 500R compared with the alternative material) on prior approval from the TPCODL. (If different material offered the bidders should submit material data sheet in technical bid)
		5.1.5	Meter cover & base shall be provided with continuous and seamless Ultrasonic welding such that it cannot be opened without breaking the enclosure. Front cover & base shall be such that it is not possible to cut & open the meter without certainly damaging the meter body and by no means shall an attempt to reassemble would not leave physical evidence. The damage evidences should be visible externally& should be traceable in such a way that attempts can be proved in court of law.
		5.1.6	The meter body shall be sealed in such a way that opening of meter base and cover is possible only after breaking the seal(s).
		5.1.7	During meter manufacturing the meter seal fixing should be tightened such that the seal body should be close to meter body.
		5.1.8	Unidirectional screws to be used on meter covers where ever required.
		5.1.9	The Meter body shall be such that the liquid or chemical shall not reach the electronic parts (in installed condition), if liquid is injected from any side of meter body such as meter terminals, push button, display, NIC card casing etc. Necessary protection and water tight sealing to be provided at terminals and Push buttons etc.
5.2	**Terminals, Terminal Block**	5.2.1	Even after any attempts the terminal block should get disengaged, opened or loosen from any side. Any attempt to disengage the terminal block should certainly damage the meter body with physical evidences. The damage evidences should be visible externally& should be traceable in such a way that attempts can be proved in court of law.
		5.2.2	Terminals may be grouped in terminal block having adequate insulating

			properties and mechanical strength. In order to satisfy such requirements when choosing insulating virgin materials for the terminal block adequate testing of materials shall be taken into account.
		5.2.3	Terminal block and terminal cover shall be of a material which complies with the requirements of IS11731 (part 1) method FH1. The material of which the terminal block is made shall be capable of passing the Heat Deflection temperature test given in ISO 75 for temperature of 135°C and pressure of 1.8 MPa as mentioned in IS 14697. Tested as per ISO 75-2/A or ASTM D648.
		5.2.4	The terminal block shall be of opaque with virgin polycarbonate LEXAN500R or equivalent (complying with above requirement) on prior approval from the TPCODL. (The bidders should submit material data sheet in technical bid)
		5.2.5	The terminal block, the terminal cover and the meter case shall ensure reasonable safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them. The material and plating details of terminals screw shall be submitted by the bidder.
		5.2.6	The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there is no risk of loosening or undue heating. Terminal & screw should not be damaged during regular opening and tightening.
		5.2.7	**Temperature sensor** to be provided for sensing the temperature and meter should be programmed in such way that on reaching the threshold value set (as per tamper table no. 1) the event/alert should go to HES.
		5.2.8	Internal diameter of the terminal holes shall be minimum 5 mm; minimum clearance between adjacent terminals shall be 10 mm. Minimum Depth of the terminal holes shall be of 20 mm.
		5.2.9	Minimum two number of terminal screws to be provided per terminal wire.
		5.2.10	Terminal block shall be such that the risk of corrosion resulting from contact with any other metal part is minimized. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material.
		5.2.11	Meter terminal should have 10 terminals arrangement. The terminals should have center to center distance of min. 11.5mm. Terminal configuration shall be R-Cin, R volt, R-Cout, Y-Cin, Y volt, Y-Cout, B-Cin, B-volt, B-Cout, Neutral.
5.3	**Terminal Cover**	5.3.1	Terminal cover shall be short type and transparent with virgin polycarbonate LEXAN 143R/943A or equivalent on prior approval from the TPCODL (the bidders should submit the relevant material data sheet in technical bid).
		5.3.2	Appropriate space shall be available for incoming /outgoing cables without damaging/stressing terminal cover (terminal cover design shall be as per the TPCODL approval). After sealing the cover, terminals shall not be accessible without breaking the seals. Terminal cover should be of short type 20-25 mm length. The system connection diagram shall be provided on the terminal cover.
		5.3.3	The terminal cover design should be such that the sealing screw locking provision on cover should have min dimension of 3mmx3mm. (Excluding seal lock hole)
		5.3.4	The terminal cover should open on the top side, during connection of the cables. The side opening of terminal cover is not acceptable due to additional opening space requirement.
5.4	**Sealing of meter,**	5.4.1	The system connection diagram shall be provided on the terminal cover.

	terminal cover and NIC cover	Reliable sealing arrangement shall be provided to make the meter tamper evident and to avoid fiddling or tampering by unauthorized persons. 5.4.2 For this, one no. Polycarbonate seal and three no. Hologram seal with unique serial numbers (on Left, Right & Top side) shall be provided by the bidder. One no polycarbonate seal shall be provided by the TPCODL. This seal shall be fix on right hand side of meter. 5.4.3 All the seals with unique serial numbers shall be fixed on meter body by the bidder at his works before calling for inspection. 5.4.4 Two sealing provision shall be provided at meter terminal cover, such that terminal shall not be accessible without breaking the seals. All the seals shall be provided on front side only and as per the TPCODL specification. Rear side sealing arrangement shall not be accepted. Bidder shall provide seals be as per CEA regulation (2006). Only patented seals to be used as per CEA requirements. 5.4.5 The bidder shall provide TPCODL(MMG store and MTL) the soft record of polycarbonate seal and hologram seal serial number and NIC card serial number used against each meter serial number along with its position (RHS/LHS/Top/Meter body/ NIC Cover) in tabular form for every lot of meter. 5.4.6 Plug in type NIC card cover should have proper sealing arrangement and should be sealed with manufacturer's polycarbonate seal.
5.5	**TOD Feature**	The meter shall be capable of measuring Cumulative Energy (kWh & kVAh)both for IMPORT and IMPORT – EXPORT mode, wherever applicable and MD (kW & kVA) with time of day (TOD) registers having 8 zones & 02 seasons (no. of zones & time slot shall be programmable by MRI/ Over the air with adequate security level and in one to one /broadcast mode over the air). Current TOD (during tender) to be given is as below: **Slots** | **Time Slot** | **Jan-Dec** Off-peak | 0000-0600 | Register 1 Normal | 0600-2400 | Register 2 **# The bidder to ask TPCODL for latest TOD timing slots before manufacturing of every lot.**
5.6	**MD Integration**	The MD integration period shall be 15 minutes, as applicable (integration period-programmable by MRI/HHU at site and also through HES with adequate security level). The MD resetting shall be automatic at the 1st of the month i.e. 0000 hours of 1st day of the month. Manual MD reset button shall not be available. Last 12 MD values shall be stored in the memory. MD shall be recorded and displayed with minimum three digits before decimal and minimum three digits after decimal points. MD integration shall be of sliding Type at an interval of 10 min.
5.7	**Parameters in Meter/HES**	All these parameters shall be downloaded locally or remotely and interpreted in PC/Laptop. All the parameters shall be recorded and memorized in its Non Volatile Memory (NVM). The corresponding Non Volatile Memory shall have a minimum retention time of 15 years. It is to be ensured that any data which is pushed / pulled from meter must have Meter Sr. No. as one of the parameters. Time-sync with RTC and over-writes on drift threshold. Clarity on event logged in memory and server time-stamps matching. 'Fail' to be log in memory in the following conditions: a) RTC fail b) NVM memory fail c) Battery fail
5.7.1	**Load survey (for pre-paid, post-**	Meter serial number and NIC serial number shall be recorded and communicated for all profiles of data. The meter shall be capable of recording 15 minutes average of the

	paid & NET meter mode)	following parameters for at least last 45 days a) Voltage for each phase b) Current of each phase c) Average PF d) Average kWh e) Average kVAh (lag only, for import only) f) kVArh(Lagging) g) kVArh(Leading) h) Demand (KW) i) Demand(KVA) j) Temperature near terminal block (˚C) k) THD Voltage phase wise l) THD Current phase wise Meter shall be capable of recording daily Energy and Demand 00:00 to 24:00 Hrs kWh/kVAh, kW/kVA for 45 days. Midnight energy value of cumulative KWh, KVAh along with H1 KW and KVA along with daily consumption kWh should be available in meter memory for last 45 days. Load survey data should be at least with 5 decimal place
5.7.2	**Instantaneous Parameters**	Meter serial number and NIC serial number shall be recorded and communicated for all profiles of data. Meter shall be capable for following Instantaneous Parameters in Memory and should be available in HES.

Meter Sr.No.	
NIC Sr. No.	
Meter Type	3P HT
Meter date & Time	DD MM YYYY HH MM SS
Voltage –R	000.000V
Voltage –Y	000.000V
Voltage –B	000.000V
Line Current –R	00.000A
Line Current –Y	00.000A
Line Current –B	00.000A
Active Current –R	00.000A
Active Current –Y	00.000A
Active Current –B	00.000A
Reactive Current-R	00.000A
Reactive Current-Y	00.000A
Reactive Current-B	00.000A
Power factor-R	0.000
Power factor-Y	0.000
Power factor-B	0.000
Average Power factor	0.000
Instantaneous Frequency	00.000Hz
Instantaneous Load	Active ,Reactive Lag/Lead, Apparent
Present Cumulative Energy	Active ,Reactive Lag/Lead, Apparent
Cumulative Power Off Duration	00000
Cumulative Power ON Duration	00000
Cumulative Tamper count	00000
Terminal Block Temperature (˚C)	
Cumulative Billing Count	00000
Last Billing date	dd:mm:yy
No of Power failure	00000

		Vector/phasor diagram In case one of the voltage is missing, vector should be made with 2 voltage and all currents.	
5.7.3	**General Information**	Meter shall be capable for providing below mentioned general parameters in memory **Meter Serial number** Firmware Version Manufacture Name Manufacture Date (DD/MM/YYYY) Meter Type Meter Class Meter Constant Meter Voltage Rating Meter Current Rating TOD profile showing timing and seasons # NIC Sr. No. NIC make # if any additional key is required to see this value, it should be provided without any additional cost to TPCODL .	
5.7.4	**Billing Parameters**	1) Meter serial number and NIC serial number shall be recorded and communicated for all profiles of data. **All these below mentioned data should be available for Import Mode and Export-Import Mode, as applicable**. 2) Cumulative kWh, kVAh (lag only for import mode), kVArh lead, lag (all import and export) and TOD1 kWh,TOD2 kWh,TOD1 kVAh (lag only for import mode),TOD2 kVAh (lag only for import mode), For present and last 12 Resets (reset date for all resets/history, time zone register wise). 3) Maximum Demand Absolute Active Load and Absolute Apparent load and TOD1 kW,TOD2 kW,TOD1 kVA (lag only for import mode),TOD2 kVA (lag only for import mode), for present and last 12 Resets (reset date for all resets/history, time zone register wise) along with date and time stamp. 4) Consumption (Reading date, Current Month & 12 History, time zone register wise) kWh and kVAh. 5) Billing Dates (12 History) 6) Cumulative Billing count 7) TOD details with day time and season wise. 8) Monthly power On/Off hours Cumulative energy parameters kWh, kVAh (lag only for import mode), kVArh lead, lag (all import and export) and TOD1 kWh, TOD2 kWh, , TOD1 kVAh (lag only for import mode), TOD2 kVAh (lag only for import mode) . The meter shall be capable of measuring Cumulative Energy (kWh & kVAh) both for IMPORT and IMPORT – EXPORT mode, wherever applicable. Note : Meter must have provision of 8 time zones.	

5.7.5	**Transactions**	All the changes in software of meter to be logged along with date & time stamp and readings indicating the particular parameter which has been programmed. Meter should do billing if any transaction is done.
5.7.6	**Tamper Events**	All events should be logged as per table no-1. The meter should not have any other event logging or any logic other than desired in specs. If any other logic is present then bidder has to disclose during tender and offering of lot and get approval for same. All other logics not mentioned in specification should be removed or disabled in meter firmware if not approved by TPCODL.
5.8	**Display units**	The display unit shall be Pin type built-in liquid crystal display (Permanently backlit type LCD). The LCD shall be of STN (Super Twisted Nematic) construction suitable for maximum temperature withstands 65˚C and minimum temperature withstands 0 ˚C during normal operating condition. The LCD display shall have a wide viewing angle of 120 degree. When the meter is not energized the electronic display need not be visible. The display shall not be affected by electrical, magnetic disturbances and ESD. The display should be readable in direct sunlight. **The back lit must be green in color for good visibility of digits in sunlight.** The kWh & kVAh register shall have minimum 8 digits LCD display and size of the digits shall be minimum 10mmx5mm. Cumulative energy (kWh & kVAh) shall be displayed without decimal in auto scroll mode. (However decimal shall be available in push button mode for high resolution display for testing).
5.8.1	**Auto Scroll mode & Push-button mode for Import and Export-Import Modes in the Meter**	Persistence time for each parameter shall be 10 second. Values followed by header shall be avoided. (I.e. if MD1 is displayed in Auto scroll mode, Header (MD1) and value (say 025.238 kW) shall be shown simultaneously; it shall not be shown in successive displays. Off time shall not be available in auto scroll mode between each cycle. Auto scroll mode is restored after 10 sec, if push button is not operated. Display should not be stuck for any tamper events. Following shall be continuously displayed in auto scroll and push button mode in the given order: **For IMPORT Mode:**

Display	Display 1	Display 2
Scroll Process	**Auto**	**Push**
LCD Check	1	1
Meter Sr. No	2	2
Date	3	3
Time	4	4
Cum. kWh	5	5
Cum. kVAh	6	6
Cum. kVARh (Lag)	7	7
Cum. kVARh (Lead)	8	8
TOD Cum. kWh (T1,T2)	9,10	9,10
TOD Cum. kVAh (T1,T2)	11,12	11,12
Current Month MD kW	13	13
Current Month MD kVA	14	14
Last Month (history 1) kWh	15	15
Last Month (history 1) kVAh	16	16
Last Month (history 1) TOD Cum. kWh (T1,T2)	17,18	17,18
Last Month (history 1) TOD Cum. kVAh (T1,T2)	19,20	19,20
Last Month (history 1) MD kW	21	21
Last Month (history 1) MD kVA	22	22
Last Month (history 1) Power Factor	23	23

Phase Voltages (Vr, Vy, Vb)	24,25,26	24,25,26
Phase Currents (Ir, Iy, Ib)	27,28,29	27,28,29
Inst. Active Power (kW)	30	30
Inst. Apparent Power (kVA)	31	31
Inst.Power Factor	32	32
Voltage Sequence (R-Y-B)	33	33
Current Sequence (R-Y-B)	34	34
High Resolution kWh	-	35
High Resolution kVAh	-	36
High Resolution kVARh (Lag)	-	37
High Resolution kVARh (Lead)	-	38
Magnetic Tamper count	-	39
Latest Magnetic tamper occurrence date	-	40
Latest Magnetic tamper occurrence Time	-	41
ESD Tamper count	-	42
Latest ESD tamper occurrence date	-	43
Latest ESD tamper occurrence time	-	44
TC Open tamper count	-	45
TC Open occurrence date of very first event	-	46
TC Open occurrence time of very first event	-	47

For IMPORT-EXPORT Mode:

Display	**Display 1**	**Display 2**
Scroll Process	**Auto**	**Push**
LCD Check	1	1
Meter Sr. No	2	2
Date	3	3
Time	4	4
Cum. Import kWh	5	5
Cum. Import kVAh	6	6
Cum. Import kVArh (Lag)	7	7
Cum. Import kVArh (Lead)	8	8
Cum. Export kWh	9	9
Cum. Export kVAh	10	10
Cum. Export kVARh (Lag)	11	11
Cum. Export kVARh (Lead)	12	12
TOD Cum. Import kWh (T1,T2)	13, 14	13, 14
TOD Cum. Import kVAh (T1,T2)	15,16	15,16
TOD Cum. Export kWh (T1,T2)	17,18	17,18
TOD Cum. Export kVAh (T1,T2)	19,20	19,20
Current Month MD kW	21	21
Current Month MD kVA	22	22

		Phase Voltages (Vr, Vy, Vb)	23,24,25	23,24,25
		Phase Currents (Ir, Iy, Ib)	26,27,28	26,27,28
		Inst. Active Power (kW)	29	29
		Inst. Apparent Power (kVA)	30	30
		Inst.Power Factor	31	31
		Voltage Sequence (R-Y-B)	32	32
		Current Sequence (R-Y-B)	33	33
		High Resolution kWh	-	34
		High Resolution kVAh	-	35
		High Resolution kVARh (Lag)	-	36
		High Resolution kVARh (Lead)	-	37

5.9 Output Device

5.9.1 **Pulse Rate:** The meters shall have a suitable test output device. 2 nos of Red color blinking LED (marked as imp/kWh and imp/Kvarh) shall be provided in the front. This device shall be suitable for using with sensing probe used with test benches or reference standard meters. Meter constant shall be indelibly printed on the name plate as imp / KWh & imp/kVArh. **Meter constant shall be as per actual without multiplying factor.**

5.9.2 **Communication LCD indicator-**Meter display shall have  indication in context to NIC. The blinking should be slow when NIC is detected; blinking should be fast when NIC had searched the network and it should be stable when it is successfully latched to the HES.

5.9.3 Phase indication : Individual phases should be displayed on LCD display of meter and shall glow with minimum operating voltage (as defined in 4.05 of GTR)

6.0 NAME PLATE AND MARKING

Meters shall have a name plate clearly visible and effectively secured against removal. The name plate data should be laser printed. The base color of Name plate shall be blue (Pantone 2727C) indelibly and distinctly marked with all essential particulars as per relevant standards along with the following:

i. Manufacturer's name
ii. Type designation
iii. Number of phases and wires
iv. Serial number (Meter serial number shall be laser printed on name plate instead on sticker).
v. Month and Year of manufacture (MM/YYYY)
vi. Unit of measurement
vii. Reference voltage ,frequency
viii. Ref. temperature if different from 27 deg. C
ix. Rated basic and maximum Current
x. Meter constant (imp/kWh, Imp/kVArh)
xi. 'BIS' Mark
xii. Class index of meter
xiii. "Property of TPCODL "
xiv. Purchase Order No. & date
xv. Guarantee period.
xvi. Rated frequency
xvii. Sign of double square
xviii. Country of manufacture.
xix. Firmware version for meter
xx. Category
xxi. Communication Tech for WAN and NAN(with carrier frequency)

<table>
<tr><td></td><td></td><td>xxii.Communication Technology is IHD supported (with carrier frequency).
However the following shall be printed in bar code on the meter nameplate(shall be laser printed on name plate instead of any sticker). All data shall be laser printed on meter along with Sr.NO and date of manufacturing. No sticker to be used to avoid loss of data in event of fire. Content Format for bar code: TPCODL MMYY XXXXXXXXX (9-digit Serial no.)

The PCB Serial number should be printed on the PCB instead of sticker.
Bidder should ensure that each NIC provided in meters are having laser printed Sr. No., MFG date, ‘Property of TPCODL’ marked, PO date and no. (same as that of meter PO)</td></tr>
<tr><td>7.0</td><td>TESTS</td><td>All routine, acceptance & type tests shall be carried out on the meter and meter body separately in accordance with the relevant IS/IEC. All routine/acceptance tests shall be witnessed by the TPCODL /his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted in addition to the tests specified in IS/IEC from CPRI/ERDA.</td></tr>
<tr><td>7.1</td><td>TYPE TEST</td><td>1) All type-tests defined in IS 16444 (Part-2) and IS 15959 (Part-3):2016
2) Test against abnormal magnetic influence as per CBIP TR 325.
3) Test for Material used for Terminal Block and meter body as per relevant standards.
4) IP test for IP 51 as per IS 60529
5) Bidder/BA must submit valid BIS license for manufacturing smart energy meters as per IS 16444 and IS 15959 (Part-3) with all requisite inclusions.</td></tr>
<tr><td>7.2</td><td>ROUTINE TEST</td><td>1) AC High Voltage test (Clause no. 12.7.6.3 of IS 14697)
2) Insulation test (Table 18 of Clause no. 12.7.6 of IS 14697)
3) Test on limits of error (Clause no. 11 of IS 14697)
4) Test of starting current (Clause no. 12.13 of IS 14697)
5) Test of no load condition (Clause no. 12.12 of IS 14697)
6) Communication check of NIC (Table27 of IS 15959 (Part 3); Clause no. 9.5 & 10 of IS 16444 Part -2)</td></tr>
<tr><td>7.3</td><td>ACCEPTANCE TEST</td><td>1) AC High Voltage test (Clause no. 12.7.6.3 of IS 14697)
2) Insulation test (Table 18 of Clause no. 12.7.6 of IS 14697)
3) Test on limits of error (Clause no. 11 of IS 14697) with following loads:
<table>
<tr><td>120% Imax</td><td>Imax (10A)</td><td>Ib (5A)</td><td>0.1 Ib</td><td>0.02 Ib</td><td>0.05Ib</td><td>0.01Ib</td></tr>
<tr><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF, 0.8 lead and 0.5 lag</td><td>UPF</td><td>UPF</td></tr>
</table>
4) Test of meter constant (Clause no. 12.14 of IS 14697)
5) Test of starting current (Clause no. 12.13 of IS 14697)
6) Test of no load condition (Clause no. 12.12 of IS 14697)
7) Test of repeatability of error (Clause no. 12.16 of IS 14697)
8) Test of power consumption (Clause no. 12.7.1 of IS 14697)
9) Test for Immunity against external influencing signal as per the TPCODL specification
10) Test for Immunity against DC Immunity as per the TPCODL specification
11) Test for Immunity against Tamper conditions as per the TPCODL specification
12) Error measurements with all abnormal condition along with ESD, magnet, jammer
13) Test to Influence of Harmonics (Table 13 of IS 14697)
14) Supply voltage and frequency variation test (Clause 11.2 & 12.10 of IS 14697)
15) Testing of self-diagnostic features (as per this technical specification)
16) Tamper count increment and logging with date and time in meter database (as per this technical specification)
17) All tests as defined in IS 15959(Part-3):2017 (clause 27 & 28)
18) Functionality of communication module IS 16444 part2
19) Meter reading on HES demand, Scheduled meter reading from HES, remote</td></tr>
</table>

		firmware upgrade from HES and all programming request from HES to be simulated and checked during inspections (as per this technical specification). 20) Physical check of NIC and replaceable ease of the NIC module in meter (as per this technical specification). 21) Any other test required as per latest IS 16444, 15999 and relevant parts shall be tested during inspections.
7.4	**Special Test**	The bidder shall demonstrate the communication capability of the meter through communication modes as defined in the specification before conducting acceptance tests.
8.0	**TYPE TEST CERTIFICATE**	The bidder shall furnish the type test certificates of the meter for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ ERDA as per BIS 16444 part-2. For communication testing any national approved laboratory or international acclaimed lab or equivalent will also suffice at the discretion of TPCODL. For technical evaluation of the tender, we may consider Type test report as per IS 14697. In such case the Bidder should provide IS16444-2 compliant test report before starting of supply of meters. Type test should have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPCODL
9.0	**PRE-DESPATCH INSPECTION**	Inspection may be made at any stage of manufacture at the discretion of the TPCODL of the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Equipment shall be subject to inspection by a duly authorized representative of the TPCODL . Bidder shall grant free access to the places of manufacture to TPCODL 's representatives at all times when the work is in progress. Inspection by the TPCODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCODL . Following documents shall be sent along with material a)Test reports b)MDCC issued by TPCODL c)Invoice in duplicate d)Packing list e)Drawings & catalogue f) Guarantee / Warrantee card g)Delivery Challan h)Other Documents (as applicable) i) One no. leaflet with each meter Note-Photographs of packed lot clearly showing s.no of meters whose inspection call has been requested should be sent along with letter for inspection call. One copy of the report shall be sent to Plant Engineering department. Two meters from the offered lot, if deemed necessary, shall be tested for all tampers at TPCODL laboratory for compliance to anti tamper feature before MDCC. The inspectors shall free to take any two meters from offered lot for testing at our Lab. BA should check and ensure each meter and reset each meter for any event logged for any tamper.
10.0	**INSPECTION AFTER RECEIPT AT STORE**	The material received at TPCODL's store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection.

11.0	**GUARANTEE**	Bidder shall stand guarantee towards design, materials, workmanship & quality of process / manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the TPCODL up to a period of at least 60 months from the date of commissioning or 66 months from the date of last supplies made under the contract whichever is earlier, Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Company, failing which the TPCODL will be at liberty to get it replaced/rectified at bidder's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the bidder or from the " Security cum Performance Deposit" as the case may be. Bidder shall own responsibility for all internal component with an end to end agreement with individual component manufacturer.
12.0	**PACKING**	1. Bidder shall ensure that all material covered under this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit. The material used for packing shall be environmentally friendly. Packing and transportation shall be as per IS 15707:206 clauses 9.1 and 9.2. 2. Individual meter should be packed in separate box. Routine test report (with manufacturing company logo) of the individual meter shall be kept inside each card board carton of the meter. 3. On back side of routine test certificate (RTC) the bidder shall print a picture of the meter with its small details like for consumer to know about meter or display parameters sheet. 4. The softcopy of the routine test certificate of each meter to be provided with each lot to TPCODL, MMG Bhubaneswar. 5. The routine test certificate shall contain results & all tests of clause no. 7.2. 6. Bar code containing information of meter Sr. No should be pasted on the outer most box in which single / group of meters are transported
13.0	**SAMPLE**	**Tendering stage:** Bidders are required to manufacture 03 numbers of sample meters as per the TPCODL specification (sealed, unsealed and open able base and cover to view/test the inner circuits) and submit the samples (non-returnable) along with bid for approval. These samples should be submitted at Meter Testing Lab, Bhubaneswar, Odisha. **Pre-manufacturing approvals:** The successful bidder shall submit two prototype samples of 11kV HT Consumer Smart meters at Meter Testing Lab, Bhubaneswar, for further testing and compliance as per specifications and shall get GTP approval before mass manufacturing. Further, for 33kV, 66kV & 220kV HT Consumer Smart Meters, one sample may be asked for demonstration and compliance as per specifications, prior to the manufacturing approval. **Following accessories to be submitted along with sample at both the tendering stage & pre-manufacturing approvals stages:** 1) Detailed manual 2) Communication cords 3) Tamper logic sheet 4) Display parameter annunciator 5) BCS 6) Internal connection diagram.
14.0	**TRAINING**	Suitable training to be arranged for TPCODL representatives, for operation and handling of every software and hardware regarding communication between meter & HHU, meter & HES, without any cost implications towards TPCODL.

15.0	**QUALITY CONTROL**	The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. Quality should be ensured at the following stages: • At PCB manufacturing stage, each board shall be subjected to computerized bare board testing. • At insertion stage, all components should undergo computerized testing for conforming to design parameter and orientation. • Complete assembled and soldered PCB should undergo functional testing using Automatic Test Equipment (ATEs). • Prior to final testing and calibration, sample meters shall be subjected to aging test (i.e. meters will be kept in ovens for 24 hours at 55 Deg. C temperature and atmospheric humidity under real-life condition at its full load current. After 24 hours meter should work satisfactorily. TPCODL's engineer(s) or its nominated representative(s) shall have free access to the bidder's/manufacturer's works to carry out inspections.
16.0	**MINIMUM TESTING FACILITIES**	Bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards. The bidder shall have duly calibrated Reference Standard meter of Class 0.1 accuracy or better.
17.0	**MANUFACTURING ACTIVITIES**	The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart shall be in line with the Quality assurance plan submitted with the offer.
18.0	**SPARES, ACCESSORIES AND TOOLS**	1. Bidder to be provide free of cost 02 nos. of jig (irrespective of order lot) for retrieving data from memory of meter with every new design of meter in which previous jig is supplied cannot be used. Jig should be such that NVM can be push fit on this jig and data can be retrieve from this NVM. 2. Five (5) nos. of optical cord against each 100 meter lot on pro-rata basis for retrieving the data of meter through optical port should be provided, if design of optical port is changed from those of previously supplied meters.
19.0	**DRAWINGS AND DOCUMENTS**	Following drawings & Documents shall be prepared based on TPCODL specifications and statutory requirements and shall be submitted with the bid: a) Completely filled-in Technical Parameters. b) General arrangement drawing of the meter c) Terminal Block dimensional drawing d) Mounting arrangement drawings. e) General description of the equipment and all components with makes and technical requirement f) Type Test Certificates g) Experience List After the award of the contract, soft copies of following drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval:

S. No.	Description	For Approval	For Review Information	Final Submission
1	Technical Parameters	√		√
2	General Arrangement drawings	√		√
3	Terminal block Dimensional drawings	√		√
4	Mounting arrangement drawing.	√		√

		5	Manual/Catalogues		√	
		6	Transport/ Shipping dimension drawing		√	√
		7	QA &QC Plan	√	√	√
		8	Routine, Acceptance and Type Test Certificates	√	√	√
		Bidder shall subsequently provide soft copy of all the drawings, GTP, data-sheet of dis-connector switch, data-sheet/ comparative analysis (of material of terminal block, terminal cover, terminal screw, meter body, meter base), Test certificates and integration documents with HES for the final approval of TPCODL, before mass manufacturing.All the documents & drawings shall be in English language.				
20.0	**GUARANTEED TECHNICAL PARTICULARS**	Clause-wise compliance to this technical specification.				

ANNEXURE I: OBIS CODES

S. No.	Instantaneous Profile	OBIS Code	OBIS Source
	Instantaneous Profile	1.0.94.91.0.255	IS15959-Part3
1	Real Time Clock - Date and Time	0.0.1.0.0.255	IS15959-Part3
2	Current - IR	1.0.31.7.0.255	IS15959-Part3
3	Current - IY	1.0.51.7.0.255	IS15959-Part3
4	Current - IB	1.0.71.7.0.255	IS15959-Part3
5	Voltage - VRN	1.0.32.7.0.255	IS15959-Part3
6	Voltage - VYN	1.0.52.7.0.255	IS15959-Part3
7	Voltage - VBN	1.0.72.7.0.255	IS15959-Part3
8	Power Factor - R phase	1.0.33.7.0.255	IS15959-Part3
9	Power Factor - Y phase	1.0.53.7.0.255	IS15959-Part3
10	Power Factor - B phase	1.0.73.7.0.255	IS15959-Part3
11	Three Phase Power Factor - PF	1.0.13.7.0.255	IS15959-Part3
12	Frequency	1.0.14.7.0.255	IS15959-Part3
13	Apparent Power - KVA	1.0.9.7.0.255	IS15959-Part3
14	Signed Active Power - kW (+ Forward; -Reverse)	1.0.1.7.0.255	IS15959-Part3
15	Signed Reactive Power - kvar (+ Lag; - Lead)	1.0.3.7.0.255	IS15959-Part3
16	Number of power failures	0.0.96.7.0.255	IS15959-Part3
17	Cumulative power-failure duration in Min	0.0.94.91.8.255	IS15959-Part3
18	Cumulative Tamper count	0.0.94.91.0.255	IS15959-Part3
19	Cumulative Billing count	0.0.0.1.0.255	IS15959-Part3
20	Cumulative programming count	0.0.96.2.0.255	IS15959-Part3
21	Billing Date	0.0.0.1.2.255	IS15959-Part3
22	Cumulative Energy - kWh, Import/Forwarded	1.0.1.8.0.255	IS15959-Part3
23	Cumulative Energy - kWh, Export	1.0.2.8.0.255	IS15959-Part3
24	Cumulative energy, kVArh(QI)	1.0.5.8.0.255	IS15959-Part3
25	Cumulative energy, kVArh(QII)	1.0.6.8.0.255	IS15959-Part3
26	Cumulative energy, kVArh(QIII)	1.0.7.8.0.255	IS15959-Part3
27	Cumulative energy, kVArh(QIV)	1.0.8.8.0.255	IS15959-Part3
28	Cumulative Energy - kVAh, Import/Forwarded	1.0.9.8.0.255	IS15959-Part3
29	Cumulative Energy - kVAh, Export	1.0.10.8.0.255	IS15959-Part3
30	MD kW, Import/Forwarded	1.0.1.6.0.255	IS15959-Part3
31	MD kVA, Import/Forwarded	1.0.9.6.0.255	IS15959-Part3
32	Temperature	0.0.96.9.128.255	TPCODL Specific
33	Neutral current	1.0.91.7.0.255	IS15959-Part2
34	%THDV R- Phase (up to 11th harmonic)	1.0.32.7.124.255	TPCODL Specific
35	%THDV Y- Phase (up to 11th harmonic)	1.0.52.7.124.255	TPCODL Specific
36	%THDV B- Phase (up to 11th harmonic)	1.0.72.7.124.255	TPCODL Specific
37	%THDI R- Phase (up to 11th harmonic)	1.0.31.7.124.255	TPCODL Specific
38	%THDI Y- Phase (up to 11th harmonic)	1.0.51.7.124.255	TPCODL Specific

39	%THDI B- Phase (up to 11th harmonic)	1.0.71.7.124.255	TPCODL Specific

S. No.	BillingProfile	OBIS Code	OBIS Source
	Billing Profile	1.0.98.1.0.255	IS15959-Part3
1	Billing Date	0.0.0.1.2.255	IS15959-Part3
2	System Power Factor For Billing Period for Import/Forwarded	1.0.13.0.0.255	IS15959-Part3
3	Cumulative Energy - kWh, Import/Forwarded	1.0.1.8.0.255	IS15959-Part3
4	Cumulative Energy kWh TZ1, Import/Forwarded	1.0.1.8.1.255	IS15959-Part3
5	Cumulative Energy kWh TZ2, Import/Forwarded	1.0.1.8.2.255	IS15959-Part3
6	Cumulative Energy kWh TZ3, Import/Forwarded	1.0.1.8.3.255	IS15959-Part3
7	Cumulative Energy kWh TZ4, Import/Forwarded	1.0.1.8.4.255	IS15959-Part3
8	Cumulative Energy kWh TZ5, Import/Forwarded	1.0.1.8.5.255	IS15959-Part3
9	Cumulative Energy kWh TZ6, Import/Forwarded	1.0.1.8.6.255	IS15959-Part3
10	Cumulative Energy kWh TZ7, Import/Forwarded	1.0.1.8.7.255	IS15959-Part3
11	Cumulative Energy kWh TZ8, Import/Forwarded	1.0.1.8.8.255	IS15959-Part3
12	Cumulative Energy - kVAh, Import/Forwarded	1.0.9.8.0.255	IS15959-Part3
13	Cumulative Energy kVAH TZ1, Import/Forwarded	1.0.9.8.1.255	IS15959-Part3
14	Cumulative Energy kVAH TZ2, Import/Forwarded	1.0.9.8.2.255	IS15959-Part3
15	Cumulative Energy kVAH TZ3, Import/Forwarded	1.0.9.8.3.255	IS15959-Part3
16	Cumulative Energy kVAH TZ4, Import/Forwarded	1.0.9.8.4.255	IS15959-Part3
17	Cumulative Energy kVAH TZ5, Import/Forwarded	1.0.9.8.5.255	IS15959-Part3
18	Cumulative Energy kVAH TZ6, Import/Forwarded	1.0.9.8.6.255	IS15959-Part3
19	Cumulative Energy kVAH TZ7, Import/Forwarded	1.0.9.8.7.255	IS15959-Part3
20	Cumulative Energy kVAH TZ8, Import/Forwarded	1.0.9.8.8.255	IS15959-Part3
21	MD kW, Import/Forwarded	1.0.1.6.0.255	IS15959-Part3
22	MD kW TZ1, Import/Forwarded	1.0.1.6.1.255	IS15959-Part3
23	MD kW TZ2, Import/Forwarded	1.0.1.6.2.255	IS15959-Part3
24	MD kW TZ3, Import/Forwarded	1.0.1.6.3.255	IS15959-Part3
25	MD kW TZ4, Import/Forwarded	1.0.1.6.4.255	IS15959-Part3
26	MD kW TZ5, Import/Forwarded	1.0.1.6.5.255	IS15959-Part3
27	MD kW TZ6, Import/Forwarded	1.0.1.6.6.255	IS15959-Part3
28	MD kW TZ7, Import/Forwarded	1.0.1.6.7.255	IS15959-Part3
29	MD kW TZ8, Import/Forwarded	1.0.1.6.8.255	IS15959-Part3
30	MD kVA, Import/Forwarded	1.0.9.6.0.255	IS15959-Part3
31	MD kVA TZ1, Import/Forwarded	1.0.9.6.1.255	IS15959-Part3
32	MD kVA TZ2, Import/Forwarded	1.0.9.6.2.255	IS15959-Part3
33	MD kVA TZ3, Import/Forwarded	1.0.9.6.3.255	IS15959-Part3
34	MD kVA TZ4, Import/Forwarded	1.0.9.6.4.255	IS15959-Part3
35	MD kVA TZ5, Import/Forwarded	1.0.9.6.5.255	IS15959-Part3
36	MD kVA TZ6, Import/Forwarded	1.0.9.6.6.255	IS15959-Part3
37	MD kVA TZ7, Import/Forwarded	1.0.9.6.7.255	IS15959-Part3

38	MD kVA TZ8, Import/Forwarded	1.0.9.6.8.255	IS15959-Part3
39	Billing Power ON Duration in Mins	0.0.94.91.13.255	IS15959-Part3
40	Cumulative Energy - kWh Export	1.0.2.8.0.255	IS15959-Part3
41	Cumulative Energy - kVAh Export	1.0.10.8.0.255	IS15959-Part3
42	Cumulative energy, kVArh(QI)	1.0.5.8.0.255	IS15959-Part3
43	Cumulative energy, kVArh(QII)	1.0.6.8.0.255	IS15959-Part3
44	Cumulative energy, kVArh(QIII)	1.0.7.8.0.255	IS15959-Part3
45	Cumulative energy, kVArh(QIV)	1.0.8.8.0.255	IS15959-Part3
46	Cumulative MD kW Import/Forwarded	1.0.1.2.0.255	TPCODL Specific
47	Cumulative MD kVA Import/Forwarded	1.0.9.2.0.255	TPCODL Specific
48	Billing Reset Type	1.0.96.50.2.255	TPCODL Specific

S. No.	Block Load Profile	OBIS Code	OBIS Source
	Block Load Profile	1.0.99.1.0.255	IS15959-Part3
1	RTC	0.0.1.0.0.255	IS15959-Part3
2	Average Current - IR	1.0.31.27.0.255	IS15959-Part3
3	Average Current - IY	1.0.51.27.0.255	IS15959-Part3
4	Average Current - IB	1.0.71.27.0.255	IS15959-Part3
5	Average Voltage - VRN	1.0.32.27.0.255	IS15959-Part3
6	Average Voltage - VYN	1.0.52.27.0.255	IS15959-Part3
7	Average Voltage - VBN	1.0.72.27.0.255	IS15959-Part3
8	Block Energy - kWh. Import/Forwarded	1.0.1.29.0.255	IS15959-Part3
9	Block Energy - kWh. Export	1.0.2.29.0.255	IS15959-Part3
10	Block energy. kVArh-Q1/Lag	1.0.5.29.0.255	IS15959-Part3
11	Block energy. kVArh-Q2	1.0.6.29.0.255	IS15959-Part3
12	Block energy. kVArh-Q3	1.0.7.29.0.255	IS15959-Part3
13	Block energy. kVArh-Q4/Lead	1.0.8.29.0.255	IS15959-Part3
14	Block Energy - kVAh. Import/Forwarded	1.0.9.29.0.255	IS15959-Part3
15	Block Energy - kVAh. Export	1.0.10.29.0.255	IS15959-Part3
16	R Phase Block Energy - kWh. Import/Forwarded	1.0.21.29.0.255	TPCODL Specific
17	Y Phase Block Energy - kWh. Import/Forwarded	1.0.41.29.0.255	TPCODL Specific
18	B Phase Block Energy - kWh. Import/Forwarded	1.0.61.29.0.255	TPCODL Specific
19	Average Frequency	1.0.14.27.0.255	TPCODL Specific
20	Average Neutral current	1.0.91.29.0.255	TPCODL Specific
21	%THDV R- Phase Average(up to 11th harmonic)	1.0.32.128.124.255	TPCODL Specific
22	%THDV Y- Phase Average(up to 11th harmonic)	1.0.52.128.124.255	TPCODL Specific
23	%THDV B- Phase Average(up to 11th harmonic)	1.0.72.128.124.255	TPCODL Specific
24	%THDI R- Phase Average (up to 11th harmonic)	1.0.31.128.124.255	TPCODL Specific
25	%THDI Y- Phase Average(up to 11th harmonic)	1.0.51.128.124.255	TPCODL Specific
26	%THDI B- Phase Average(up to 11th harmonic)	1.0.71.128.124.255	TPCODL Specific
27	Average R Phase PF	1.0.33.29.0.255	TPCODL Specific
28	Average Y Phase PF	1.0.53.29.0.255	TPCODL Specific

29	Average B Phase PF	1.0.73.29.0.255	TPCODL Specific

Note: Load Profile parameters are required to be field programmable, a TPCODL specific OBIS code will be used for this purpose and on changing capture objects LS data will be reset.

S. No.	Daily Load Profile	OBIS Code	OBIS Source
	Daily Load Profile	1.0.99.2.0.255	IS15959-Part3
1	Real Time Clock - Date and Time	0.0.1.0.0.255	IS15959-Part3
2	Cumulative Energy - kWh, Import/Forwarded	1.0.1.8.0.255	IS15959-Part3
3	Cumulative Energy - kWh, Export	1.0.2.8.0.255	IS15959-Part3
4	Cumulative Energy - kVAh, Import/Forwarded	1.0.9.8.0.255	IS15959-Part3
5	Cumulative Energy - kVAh, Export	1.0.10.8.0.255	IS15959-Part3
6	Cumulative energy, kVArh(QI)	1.0.5.8.0.255	IS15959-Part3
7	Cumulative energy, kVArh(QII)	1.0.6.8.0.255	IS15959-Part3
8	Cumulative energy, kVArh(QIII)	1.0.7.8.0.255	IS15959-Part3
9	Cumulative energy, kVArh(QIV)	1.0.8.8.0.255	IS15959-Part3

S. No.	Name Plate Profile	OBIS Code	OBIS Source
	Name Plate Profile	0.0.94.91.10.255	IS15959-Part2
1	Meter Serial number	0.0.96.1.0.255	IS15959-Part2
2	Device ID	0.0.96.1.2.255	IS15959-Part2
3	Manufacturer Name	0.0.96.1.1.255	IS15959-Part2
4	Firmware Version for meter	1.0.0.2.0.255	IS15959-Part2
5	Meter Type (1Phase/3P-3W/3P-4W)	0.0.94.91.9.255	IS15959-Part2
6	Category	0.0.94.91.11.255	IS15959-Part2
7	Current rating	0.0.94.91.12.255	IS15959-Part2
8	Meter Year ofTPCODL	0.0.96.1.4.255	IS15959-Part2
9	Internal CT Ratio	1.0.0.4.2.255	IS 15959 Part1
10	Internal PT Ratio	1.0.0.4.3.255	IS 15959 Part1

S. No.	Profile for Voltage events	OBIS Code	OBIS Source
	Voltage related events Profile	0.0.99.98.0.255	IS15959-Part3
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part3
2	Event Code (voltage events)	0.0.96.11.0.255	IS15959-Part3
3	Current - IR	1.0.31.7.0.255	IS15959-Part3
4	Current - IY	1.0.51.7.0.255	IS15959-Part3
5	Current - IB	1.0.71.7.0.255	IS15959-Part3
6	Voltage - VRN	1.0.32.7.0.255	IS15959-Part3
7	Voltage - VYN	1.0.52.7.0.255	IS15959-Part3
8	Voltage - VBN	1.0.72.7.0.255	IS15959-Part3
9	R Phase Pf	1.0.33.7.0.255	IS15959-Part3
10	Y Phase Pf	1.0.53.7.0.255	IS15959-Part3

11	B Phase Pf	1.0.73.7.0.255	IS15959-Part3
12	kWh Import/Forwarded	1.0.1.8.0.255	IS15959-Part3
13	kWh Export	1.0.2.8.0.255	IS15959-Part3
14	Cumulative tamper count	0.0.94.91.0.255	IS15959-Part3
15	kVAh Import/Forwarded	1.0.9.8.0.255	IS15959-Part3
16	R Phase active Current	1.0.31.7.128.255	TPCODL Specific
17	Y Phase active Current	1.0.51.7.128.255	TPCODL Specific
18	B Phase active Current	1.0.71.7.128.255	TPCODL Specific
19	Neutral current	1.0.91.7.0.255	IS15959-Part2
20	Total PF	1.0.13.7.0.255	IS15959-Part3

S. No.	Profile for Current events	OBIS Code	OBIS Source
	Current related events Profile	0.0.99.98.1.255	IS15959-Part3
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part3
2	Event Code (Current events)	0.0.96.11.1.255	IS15959-Part3
3	Current - IR	1.0.31.7.0.255	IS15959-Part3
4	Current - IY	1.0.51.7.0.255	IS15959-Part3
5	Current - IB	1.0.71.7.0.255	IS15959-Part3
6	Voltage - VRN	1.0.32.7.0.255	IS15959-Part3
7	Voltage - VYN	1.0.52.7.0.255	IS15959-Part3
8	Voltage - VBN	1.0.72.7.0.255	IS15959-Part3
9	R Phase Pf	1.0.33.7.0.255	IS15959-Part3
10	Y Phase Pf	1.0.53.7.0.255	IS15959-Part3
11	B Phase Pf	1.0.73.7.0.255	IS15959-Part3
12	kWh Import/Forwarded	1.0.1.8.0.255	IS15959-Part3
13	kWh Export	1.0.2.8.0.255	IS15959-Part3
14	Cumulative tamper count	0.0.94.91.0.255	IS15959-Part3
15	kVAh Import/Forwarded	1.0.9.8.0.255	IS15959-Part3
16	R Phase active Current	1.0.31.7.128.255	TPCODL Specific
17	Y Phase active Current	1.0.51.7.128.255	TPCODL Specific
18	B Phase active Current	1.0.71.7.128.255	TPCODL Specific
19	Neutral current	1.0.91.7.0.255	IS15959-Part2
20	Total PF	1.0.13.7.0.255	IS15959-Part3

S. No.	Profile for Power Fail events	OBIS Code	OBIS Source
	Power Fail event profile	0.0.99.98.2.255	IS15959-Part3
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part3
2	Event Code (power fail events)	0.0.96.11.2.255	IS15959-Part3

S. No.	Profile for Transaction events	OBIS Code	OBIS Source
	Transaction event Profile	0.0.99.98.3.255	IS15959-Part3
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part3

2	Event Code (transaction events)	0.0.96.11.3.255	IS15959-Part3

S. No.	Profile for Others events	OBIS Code	OBIS Source
	Others related events Profile	0.0.99.98.4.255	IS15959-Part3
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part3
2	Event Code (Others events)	0.0.96.11.4.255	IS15959-Part3
3	Current - IR	1.0.31.7.0.255	IS15959-Part3
4	Current - IY	1.0.51.7.0.255	IS15959-Part3
5	Current - IB	1.0.71.7.0.255	IS15959-Part3
6	Voltage - VRN	1.0.32.7.0.255	IS15959-Part3
7	Voltage - VYN	1.0.52.7.0.255	IS15959-Part3
8	Voltage - VBN	1.0.72.7.0.255	IS15959-Part3
9	R Phase Pf	1.0.33.7.0.255	IS15959-Part3
10	Y Phase Pf	1.0.53.7.0.255	IS15959-Part3
11	B Phase Pf	1.0.73.7.0.255	IS15959-Part3
12	kWh Import/Forwarded	1.0.1.8.0.255	IS15959-Part3
13	kWh Export	1.0.2.8.0.255	IS15959-Part3
14	Cumulative tamper count	0.0.94.91.0.255	IS15959-Part3
15	kVAh Import/Forwarded	1.0.9.8.0.255	IS15959-Part3
16	R Phase active Current	1.0.31.7.128.255	TPCODL Specific
17	Y Phase active Current	1.0.51.7.128.255	TPCODL Specific
18	B Phase active Current	1.0.71.7.128.255	TPCODL Specific
19	Neutral current	1.0.91.7.0.255	IS15959-Part2
20	Total PF	1.0.13.7.0.255	IS15959-Part3

S. No.	Profile for Non Rollover events	OBIS Code	OBIS Source
	Non Rollover event profile	0.0.99.98.5.255	IS15959-Part3
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part3
2	Event Code (non-rollover events)	0.0.96.11.5.255	IS15959-Part3

S. No.	Profile forTPCODL Specific events compartments	OBIS Code	OBIS Source
	TPCODL Specific events compartments profile	0.0.99.98.128.255	TPCODL Specific
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part3
2	Event Code (Non Standard events)	0.0.96.11.128.255	TPCODL Specific
3	Current - IR	1.0.31.7.0.255	IS15959-Part3
4	Current - IY	1.0.51.7.0.255	IS15959-Part3
5	Current - IB	1.0.71.7.0.255	IS15959-Part3
6	Voltage - VRN	1.0.32.7.0.255	IS15959-Part3
7	Voltage - VYN	1.0.52.7.0.255	IS15959-Part3
8	Voltage - VBN	1.0.72.7.0.255	IS15959-Part3
9	R Phase Pf	1.0.33.7.0.255	IS15959-Part3
10	Y Phase Pf	1.0.53.7.0.255	IS15959-Part3

11	B Phase Pf	1.0.73.7.0.255	IS15959-Part3
12	kWh Import/Forwarded	1.0.1.8.0.255	IS15959-Part3
13	kWh Export	1.0.2.8.0.255	IS15959-Part3
14	Cumulative tamper count	0.0.94.91.0.255	IS15959-Part3
15	kVAh Import/Forwarded	1.0.9.8.0.255	IS15959-Part3
16	R Phase active Current	1.0.31.7.128.255	TPCODL Specific
17	Y Phase active Current	1.0.51.7.128.255	TPCODL Specific
18	B Phase active Current	1.0.71.7.128.255	TPCODL Specific
19	Neutral current	1.0.91.7.0.255	IS15959-Part2
20	Total PF	1.0.13.7.0.255	IS15959-Part3
21	Temperature	0.0.96.9.128.255	TPCODL Specific

S. No.	Profile for Digital Input events Compartments	OBIS Code	OBIS Source
	Digital Input event Profile	0.0.99.98.130.255	TPCODL Specific
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part2
2	Event Code (Digital Input events)	0.0.96.11.129.255	TPCODL Specific

S. No.	Event Push Profile	OBIS Code	OBIS Source
1	Device ID	0.0.96.1.2.255	IS15959-Part3
2	Event Push SM to HES	0.4.25.9.0.255	IS15959-Part3
3	Real Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part3
4	Event Status Word 1	0.0.94.91.18.255	IS15959-Part3

S. No.	Phasor profile	OBIS Code	OBIS Source
	Phasor Profile	1.0.99.128.128.255	TPCODL Specific
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part3
2	Current - IR	1.0.31.7.0.255	IS15959-Part3
3	Current - IY	1.0.51.7.0.255	IS15959-Part3
4	Current - IB	1.0.71.7.0.255	IS15959-Part3
5	Voltage - VRN	1.0.32.7.0.255	IS15959-Part3
6	Voltage - VYN	1.0.52.7.0.255	IS15959-Part3
7	Voltage - VBN	1.0.72.7.0.255	IS15959-Part3
8	Signed Power Factor –R phase	1.0.33.7.0.255	IS15959-Part3
9	Signed Power Factor –Y phase	1.0.53.7.0.255	IS15959-Part3
10	Signed Power Factor –B phase	1.0.73.7.0.255	IS15959-Part3
11	Three Phase Power Factor – PF	1.0.13.7.0.255	IS15959-Part3
12	Frequency	1.0.14.7.0.255	IS15959-Part3
13	Apparent Power - kVA	1.0.9.7.0.255	IS15959-Part3
14	Signed Active Power - kW (+ Forward; -Reverse)	1.0.1.7.0.255	IS15959-Part3
15	Signed Reactive Power - kvar (+ Lag; - Lead)	1.0.3.7.0.255	IS15959-Part3
16	Signed R Phase Active Power	1.0.21.7.0.255	TPCODL Specific

17	Signed Y Phase Active Power	1.0.41.7.0.255	TPCODL Specific
18	Signed B Phase Active Power	1.0.61.7.0.255	TPCODL Specific
19	Angle Between Y- R Phase voltage	1.0.81.7.10.255	TPCODL Specific
20	Angle Between B- R Phase voltage	1.0.81.7.20.255	TPCODL Specific
21	Angle between two phase voltage	1.0.81.7.128.255	TPCODL Specific
22	Phase Sequence	1.0.128.7.0.255	TPCODL Specific

S. No.	Programable Parameters	OBIS Code	OBIS Source
1	Real Time clock change	0.0.1.0.0.255	IS15959-Part3
2	Demand Integration Period change	1.0.0.8.0.255	IS15959-Part3
3	Profile captured period	1.0.0.8.4.255	IS15959-Part3
4	single-action schedule for billing dates	0.0.15.0.0.255	IS15959-Part3
5	Activity calendar for times zones	0.0.13.0.0.255	IS15959-Part3
6	Image Transfer	0.0.44.0.0.255	IS15959-Part3
7	Metering Mode	0.0.94.96.19.255	IS15959-Part3
8	Current Association MR (LLS secret change)	0.0.40.0.2.255	IS15959-Part3
9	Current Association US (HLS Key change)	0.0.40.0.3.255	IS15959-Part3
10	Current Association FW (HLS Key change)	0.0.40.0.5.255	IS15959-Part3
11	Global key change(Security Setup Global Key Change)	0.0.43.0.0.255	IS15959-Part3
12	Image activation single action schedule	0.0.15.0.2.255	IS15959-Part3
13	ESWF	0.0.94.91.26.255	IS15959-Part3
14	MD Reset	0.0.10.0.1.255	IS15959-Part3
15	Display Parameters Auto Scroll	0.0.96.128.0.255	TPCODL Specific
16	Display Parameters Push Button	0.0.96.128.1.255	TPCODL Specific
17	Display Parameters High Resolution Button	0.0.96.128.2.255	TPCODL Specific
18	Missing potential Threshold Configuration	1.0.12.129.131.255	TPCODL Specific
19	Over Voltage Threshold Configuration	1.0.12.129.129.255	TPCODL Specific
20	Low Voltage Threshold Configuration	1.0.12.129.130.255	TPCODL Specific
21	Voltage unbalance Threshold Configuration	1.0.12.129.128.255	TPCODL Specific
22	Current Reversal Threshold Configuration	1.0.11.129.128.255	TPCODL Specific
23	CT Open Threshold Configuration	1.0.11.129.129.255	TPCODL Specific
24	Current unbalance Threshold Configuration	1.0.11.129.130.255	TPCODL Specific
25	Over Current Threshold Configuration	1.0.11.129.132.255	TPCODL Specific
26	CT Bypass Threshold Configuration	1.0.11.129.131.255	TPCODL Specific
27	Very Low PF Threshold Configuration	1.0.13.129.128.255	TPCODL Specific
28	Load Limit KW Set	0.0.17.0.0.255	TPCODL Specific
29	Temperature rise Threshold Configuration	0.0.96.128.3.255	TPCODL Specific
30	Missing potential Persistence time Configuration	1.0.12.130.131.255	TPCODL Specific
31	Over Voltage Persistence time Configuration	1.0.12.130.129.255	TPCODL Specific
32	Low Voltage Persistence time Configuration	1.0.12.130.130.255	TPCODL Specific
33	Voltage unbalance Persistence time Configuration	1.0.12.130.128.255	TPCODL Specific
34	Current Reversal Persistence time Configuration	1.0.11.130.128.255	TPCODL Specific

35	CT Open Persistence time Configuration	1.0.11.130.129.255	TPCODL Specific
36	Current unbalance Persistence time Configuration	1.0.11.130.130.255	TPCODL Specific
37	Over Current Persistence time Configuration	1.0.11.130.132.255	TPCODL Specific
38	CT Bypass Persistence time Configuration	1.0.11.130.131.255	TPCODL Specific
39	Power ON-OFF Persistence time Configuration	0.0.96.128.4.255	TPCODL Specific
40	Magnetic influence Persistence time Configuration	0.0.96.128.5.255	TPCODL Specific
41	Neutral Disturbance Persistence time Configuration	1.0.96.128.0.255	TPCODL Specific
42	Very Low PF Persistence time Configuration	1.0.13.130.128.255	TPCODL Specific
43	Over load Persistence time Configuration	1.0.1.130.128.255	TPCODL Specific
44	Temperature rise Persistence time Configuration	0.0.96.128.6.255	TPCODL Specific
45	Digital Output Configuration	1.0.96.128.3.255	TPCODL Specific
46	Load Profile capture Objects	1.0.96.128.2.255	TPCODL Specific
47	Demand Method Configuration	1.0.96.50.3.255	TPCODL specific
48	Event Enable/Disable Configuration	0.0.96.128.7.255	TPCODL specific

S. No.	Accuracy Check Data Profile	OBIS Code	OBIS Source
	Accuracy Check data Profile	1.0.99.128.129.255	TPCODL Specific
1	Cumulative Energy - kWh, Import/Forwarded	1.0.1.8.0.255	IS15959-Part2
2	Cumulative Energy - kWh, Export	1.0.2.8.0.255	IS15959-Part2
3	Cumulative energy, kVArh(QI)	1.0.5.8.0.255	IS15959-Part2
4	Cumulative energy, kVArh(QII)	1.0.6.8.0.255	IS15959-Part2
5	Cumulative energy, kVArh(QIII)	1.0.7.8.0.255	IS15959-Part2
6	Cumulative energy, kVArh(QIV)	1.0.8.8.0.255	IS15959-Part2
7	Cumulative Energy - kVAh, Import/Forwarded	1.0.9.8.0.255	IS15959-Part2
8	Cumulative Energy - kVAh, Export	1.0.10.8.0.255	IS15959-Part2

Note: Accuracy check profile is used by windows based HHU to check meter accuracy in field.

ANNEXURE-II

PART-A/ LOT-6

TECHNICAL SPECIFICATION FOR

TWO YEAR RATE CONTRACT FOR

SUPPLY OF

THREE PHASE DT SMART ENERGY METER

UNDER SMART METERING PROJECT

Tender Enquiry No.

TPCODL/ P&S/ 167 (Part-A/ Lot-6)/ 2020-21

CONTENTS

1 SCOPE

The specification covers design, engineering, manufacturing, assembly, inspection, testing & integration with network integration card (NIC) at manufacturers' works before dispatch, forwarding, unloading at store/site and supply of 3 phase 4 wire, 3 X 230 volts, 100/5 Amp CT (Ratio-Programmable as per requirement) operated static smart meter of Class 0.5s accuracy complete with all accessories for efficient and trouble free operation for indoor & outdoor use with communication module (NIC) compatible with 4G and fall back to 2G technology.

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

2 APPLICABLE STANDARDS

The equipment covered by this specification shall conform to the requirements stated in latest editions of relevant Indian/ IEC Standards and shall conform to the regulations of local statutory authorities.

a	IS 14697(1999)	A.C. static transformer operated watt hour and Var-hour meters, class 0.2s,0.5s
b	IS 16444(2015)	Only communication part
c	IS 9000	Basic Environmental testing procedure for electrical and electronic items
d	IS 12346 (1999)	Specification for testing equipment for A.C. Electrical energy meter
e	IS11000 (1984)	Fire hazard testing
f	IEC 62053-11 *(2003)*	Electricity metering equipment (a.c.)-Particulars requirements-part 11:Electromechanical meter for active energy(classed 0.5,1.0 and 2)
g	IEC 62053-22 (2003)	Electricity metering equipment (a.c.)-Particulars
h	IS 15707 (2006)	Testing Evaluation installation and maintenance of AC Electricity.
i	IEC 60068	Environmental testing
j	CBIP- TR No.325	Specification for A.C.Static Electrical Energy Meters (latest amendment).
k	CEA Regulation (2006)	Installation and operation of meters Dtd: 17/03/2006
l	IS 15959(Part 1-2011)	Data exchange for electricity meter reading, tariff and load control
m	IS 15959(Part 2-2016)	Data exchange for electricity meter reading , tariff and load control

3	CLIMATIC CONDITIONS OFTHE INSTALLATION	a) Max. Ambient Temperature : 50deg.C b) Max. Daily average ambient temp. : 40 deg.C c) Min Ambient Temp : 0 deg C d) Maximum Humidity : 100% e) Minimum Humidity : 10% f) Average No. of thunderstorm days per annum : 50 g) Maximum Annual Rainfall : 750 mm h) Average No. of rainy days per annum : 60 i) Rainy months : June to Oct. j) Altitude above MSL not exceeding : 300 meters k) Wind Pressure : 126 kg/sq m The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.3 g.

4 GENERAL TECHNICALREQUIREMNTS

S.No.	DESCRIPTION	REQUIREMENT
4.1	Type of the meter	Three phase four wire, CT operated static smart meter. It consisting of measuring elements(s),time of use of register(s),display, and plug in type bi-directional communication module all integral with the meter housing.
4.2	Accuracy Class of the meter	0.5s
4.3	Basic Current (I_b) & Rated Maximum current (I_{max})	I_b= 5A; I_{max}= 10Amps
4.4	Reference Conditions for Testing the performance of the meter	V_{ref} = 230 V Frequency = 50hz Temperature= 27 ^{0}C (if the tests are made at the temperature other than reference temperature the results shall be corrected by applying Mean Temperature Coefficient 0.05)
4.5	Operating Voltage	Meter shall be operational with required accuracy from 0.6 Vref to 1.2 Vref.
4.6	Operating Frequency	50 Hz± 5%.
4.7	Power Consumption	Voltage circuit: Maximum 5.0 W and 15 VA Current Circuit :Maximum 4 VA (The additional power requirement during data transmission shall not exceed 7W/as mentioned in IS 16444 which ever is lower, per communication module).
4.8	Starting Current	5 mA (0.1% of Ib)
4.9	Short time over current(Secondary)	200 Amp for 0.5sec (20Imax for 0.5 Sec)
4.10	Influence of heating	Temperature rise at any point of the external surface of the meter shall not exceed by more than 20K with an ambient temperature at 45^0 C.
4.11	Rated Impulse withstand voltage	6KV (Shall be applied ten times with one polarity & then repeated with the other polarity and minimum time between each impulse

				to be 3 sec.
		4.12	AC withstand voltage for 1 min	4 KV
		4.13	Minimum Insulation resistance a) Between frame & current, voltage circuits connected together: b) Between each current (or voltage circuit) & each and every other circuit. :	5 M ohm 50 M ohm.
		4.14	Mechanical requirements	Meter shall be in compliance with clause 12.3 of IS 14697
		4.15	Resistance to heat and fire	The terminal block, terminal cover and Meter case shall ensure safety against spread of fire. They should not be ignited by thermal overload of live parts in contact with them as per clause 6.8 of IS 14697.
		4.16	Protection against penetration of dust and water.	Degree of protection :IP 51 as per IS 12063, but without suction in the meter.
		4.17	Resistance against Climatic influence.	Meter shall be in compliance with clause 12.6 of IS 14697.
		4.19	Accuracy requirements	Meter shall be in compliance with clause 11 of IS 14697.
		4.20	Power factor range	Zero lag to Zero lead.(meter shall be programmed for 'Lag only configuration i.e. lead to be treated as unity PF for KVAh calculation)
		4.21	Energy measurement	Fundamental energy +Energy due to Harmonics .
		4.22	Connection Diagram	The connection diagram for the system shall be provided on terminal cover.
		4.23	Self Diagnostic feature	The meter shall have indications for un satisfactory / non-functioning of, i) Real Time Clock ii) RTC battery iii) Non Volatile Memory iv) NIC card
		4.24	Initial start up of meter	Meter shall be fully functional within 5 sec after reference voltage is applied to the meter terminals.
		4.25	Internal diameter of the terminal holes and Depth of terminal hole.	5.5mm (minimum) 25 mm
		4.26	Clearance between adjacent Terminals.	10 mm (minimum)
		4.27	Alternate mode of supply to the meters	In case of meter damage, reading/data should be retrieved with the help of battery
		4.28	Sleep Mode	Meter shall not go in sleep mode
		4.29	Display	Backlit LCD ,Scrolling ,10 seconds for each parameter
		4.30	Software and communication compatibility	The bidder shall supply software required for local (CMRI) & remote (AMI) connectivity including required training to use the software free of cost.

		4.31	Security Feature	Programmable facility to restrict the access to the information recorded at different security level such as read communication, write communication ,firmware selection from remote etc
		4.32	Usage Application	Indoor and Outdoor
		4.33	Calibration	Meters shall be software calibrated at factory and modifications in calibration shall not be possible at site by any means. However parameters like RTC, TOD tariff, DIP(billing & load survey), billing date, display parameters etc shall be reconfigure through CMRI and remotely over the air(OTA).
		4.34	Communication module of meter for AMI	As per clause no 1.2 (b) of IS 16444. Meter should have provision of communication module compatible with both the variant mentioned in IS 16444. This module should be able to get connected to the NAN / WAN network of service provider (4G) of TPCODL. Meter should be able to provide required power supply to NIC card provided by communication provider recommended by TPCODL. Size /form factor of NIC card will be provided by TPCODL to the bidder and bidder should make necessary arrangement for the same.
		4.35	Harmonics	The meter should record & display THDV and THDI as percentage . It should also indicate individual harmonic minimum up to 11 harmonics for 15 days. Integration period should be 15 minutes.
	NIC MODULE DETAILS & INTEGRATION			With the service providers offering 4G services, TPCODL intends to leverage 4G as the primary communication technology with hot swappable 2G Interface Card as a fall back for meter data acquisition. a) The Network Interface Card for 4G shall be modular and pluggable. The NIC shall be interoperable for service provider b) NIC card shall support remote Device Management Capability such as Reset, Configuration, Log Check, Ping, and over the air Firmware upgrade c) NIC shall support two-way communications between smart meter & head-end system such as data exchange, configuration parameters exchange, alarms, operational commands, firmware upgrade of the meter as defined in IS16444 and IS15959. d) NIC shall support push services, alarms services of the smart meter as defined in IS16444 and IS15959. e) 4G NIC card shall support communication protocols as prescribed by 4G HES supplier. f) NIC shall also support on-demand / schedule reading, connect / disconnect, time sync, configuration and over the air firmware upgrade from the head-end system. g) NIC shall have persistent network connectivity throughout as defined by 4G standards. It shall support self-configuring and self-healing features. h) NIC shall operate 24*7 and shall recover from any deadlock situation immediately in the field. i) Support for possibility for provision of a unique certificate/key in each card for mutual authentication with the HES from security point of view. j) NIC shall support standard security protocols. k) NIC shall be compliant with cyber security norms. l) NIC shall register with network i.e. login and logout of each terminal to the HES. It shall be recognized in the HES as authorized node. m) Attributes such as Firmware version, Hardware version, Signal strength values, packet error rate, should be pushed periodically to HES for effective communication management. n) Data must be encrypted with AES-256 bit at least. o) LED indication for System, Power ON indicator. p) Colour coded LED (a) For latching on to the network (b) For latched on to the network (c) For data flow indication.

		Meter display should have provision for showing if NIC card if : 1. Installed, 2. Getting Network, 3. Latched with HES, 4. Communicating with HES
4.36	**Communication capabilities and software feasibilities:**	4.3.1 The meter shall have facilities for data transfer locally through Meter Reading Instrument (MRI) (Using optical port/NIC card) and remotely by 4G with proper security via Plug in type NIC. Data transfer locally through optical port via MRI is desired along with data transfer through NIC card. The data downloaded in MRI/hand held device shall be integrated to HES data base. 4.3.2 It should be the responsibility of the bidder to ensure integration of meter into HES. For cellular fallback, the Module should have backward compatibility. The fall back provision shall be taken through optical port with external modem by TPCODL. Meter should be capable for sending all data from 4G NIC and optical port. 4.3.3 It shall be possible to reconfigure the meters for RTC, TOD slots reprogramming, DIP (Demand Integration period), billing date , display parameters etc. through proper authentication process locally through MRI and remotely over the air (OTA). Meter data should remain intact with timings. And billing should be done whenever any above mentioned attribute is changed. The change should be recorded as upgrade event. 4.3.4 Necessary keys if required for performing this reconfiguration operation should also be provided along with supply of meter lot & training to TPCODL staff on how to use it free of cost. Bidder to provide this support on a later stage also on the request of TPCODL without any cost implication. 4.3.5 Optical Communication port shall be available for communication. Communication ports shall not be affected by any type of injection /unauthenticated signals and having proper sealing arrangement. The complete data shall be downloaded within 5 minutes OTA. 4.3.6 Bidder to ensure integration of meter data with head end for data transfer as mentioned in specification. TPCODL reserves the right that if required, TPCODL will hand over the SIM cards to OEM and supply will be accepted with SIM cards already installed and with communication already tested in 100 % meters. For this purpose, TPCODL HES will be used for confirming data availability. 4.3.7 Meter should be supplied to TPCODL along with integrated NIC card. NIC card should be plug in type with proper sealing arrangement. 4.3.8 The bidder shall supply software required for local (MRI) & remote (AMI) connectivity including required training to use the software free of cost. Bidder shall provide the communication protocol / APIs for communication with meter through local (MRI) / remote (AMI) as and when required by TPCODL free of cost during life time of meter. The bidder should provide DLMS compliance for Communication with the meter at Optical port and at HES. 4.3.9 Bidder should also provide software for changing/upgrading meter firmware in mass and should support integration of this software with HES. Bidder should also provide base computer software (BCS) for viewing the data downloaded through HES/MRI/laptop/HHU in separate PC/laptop. Android based or windows based HHU shall be preferred. 4.3.10 For purpose of exercising control, like outage management, the meter should send abnormalities at the consumers' end like Power failure (Last Gasp) instantly, Power

			Restoration (First Breath) as event. Additional exceptional events should also be communicated to HES by meter immediately after the occurrence through 4G / 4G Mesh. It should also indicate the restoration of the same event.
		4.3.11	List of events to be reported should be configurable over the air(OTA).The meter should have "Last Gasp" and “First Breath” feature to facilitate sending alerts to the HES during fully powered off / On condition.
		4.3.12	If there are 2 requests given for communication one from HES and other from local device, request from local device should supersede.
		4.3.13	Last mile mesh network must support auto-registration and self-healing feature to continue operation using easiest possible available route in case of failure of any communication device in the mesh. Self-registrations in first communication.
		4.3.14	Meter Serial no will be used for tagging of all data of the meters in all database (at HES / MDM/ DCU level etc). However, it will be the responsibility of the Bidder to establish the complete communication solution involving all the meters in the system. Also, the Bidder must ensure that, the mode of communication used for 4G shall be consistent with the Government of India stipulations. Bidder should come out with it requirements for integration of meter with HES and MDMS clearly during tender submission.
		4.3.15	The Bidder's supplied meter with third party communication module should have suitable hand-shaking features to allow a third-party MDMS(procured by TPCODL) to configure, command, read and control smart meters installed at site. The Bidder shall extend all necessary assistance in developing the adaptor software through a third-party for facilitating the above.
		4.3.16	Integration of meter software’s with HES / MDMS for seamless transfer of data will also be in scope of bidder till the expiry of warranty of the meters. It is desired meter firmware up gradation/selection should be available over the air. Meter should be able to change to prepaid mode if required with firmware upgrade. The required firmware and any required support for integration with HES shall be provided free of cost till the useful life of the meter.
		4.3.17	Communication of the meter at optical port /OTA (NAN/WAN) should be as per IS 15959 (Part-2):2016. The optical port should be with proper lockable mechanism
		4.3.18	Communication NIC/network should be immune with any external Magnetic field/ESD/Jammer/HV voltage influence such that it shall not affect the normal overall functionality.
		4.3.19	Meter once powered up with NIC card should be self-detected by 4G network and its basic name plate details & current readings are transferred to HES.
		4.3.20	The required OBIS codes will be finalized with successful bidder. The bidder can offer desired codes from Blue Book ensuing the codes reserved or standardized by Bureau of Indian standards. The reserved codes in BIS are to be used/utilized as per guidelines of BIS and remaining codes from blue book can be used for communication of additional features mentioned in this specifications. This is to be done strictly with written approval from TPCODL after verification of proposed codes by manufacturer. In future if BIS adds any OBIS codes then the bidders to provide upgraded firmware with desired changes after in consultation and approval of TPCODL competent authority.

		4.3.21 Meter display should have provision for showing if NIC card if : 1. Installed, 2. Getting Network, 3. Latched with HES, 4. Communicating with HES 4.3.22 If any tamper occurs in power off situation, it should be pushed as soon as the meter is powered on. 4.3.23 Bidder to provide facility for Up-gradation / Modification of Firmware 4.3.24 Following parameters may be updated multiple times during life cycle of meters over the air : Post Paid to Prepaid mode and vice versa Import mode to export Mode and vice versa. Accordingly Display parameters shall be updated remotely.
4.37	**Abnormal and Tamper conditions**	**4.3.7.1** The meter shall record forward energy under all abnormal tampering conditions. The meter shall be capable of recording occurrence and restoration of abnormal events listed below along with date & time and snap shots of individual voltages, currents, power factors, active energy and apparent energy at the time of occurrence of abnormal event and restoration of normal supply. During abnormal and Tamper conditions, the current shall be recorded as active current and line current. Each such event shall be provided with minimum 25 Nos of counts to avoid missing of data amidst usual events (like power failure) due to the limitation of FIFO. Persistence time for occurrence and restoration for the events along with their threshold values shall be as per table given below. Meter should count & duration of all cumulative events of all registers.

Persistence time for occurrences	**Persistence time for restoration**	**Threshold value for Occurrence event.**	**Threshold value for restoration event.**
PT Missing=0 Hr 5 Min 0 sec	PT Missing=0 Hr 5 Min 0 sec	Voltage <70% of Vref: and current > 2% Ib.	Voltage >80% of Vref: and current > 2% Ib.
Voltage Unbalance=0 Hr 5 Min 0 sec	Voltage Unbalance=0 Hr 5 Min 0 sec	20% or more between the phases and current >2% Ib	Shall be less than 10 % between the phases and current > 2% Ib.
CT Open(phase wise)= 0 Hr 5 Min 0 sec	CT Open(phase wise)= 0 Hr 5 Min 0 sec	Ir + Iy + Ib + In ≥ 10 % of Ibasic (vector Sum). AND Phase current < 1% of Ibasic with All current +ve.	Ir + Iy + Ib + In <5 % of Ibasic. (vector Sum) AND Phase current > 10% of Ibasic with All current +ve.
CT Reversal=0 Hr 2 Min 0 sec	CT Reversal=0 Hr 2 Min 0 sec	Active current negative	Active current positive

		CT Bypass=0 Hr 5 Min 0 sec	CT Bypass=0 Hr 5 Min 0 sec	Ir + Iy + Ib + In ≥ 10 % of Ibasic (vector Sum). AND Phase current >10% of Ibasic with All current +ve.	Ir + Iy + Ib + In <5 % of Ibasic. (vector Sum) AND Phase current > 10% of Ibasic with All current +ve.
		Low Power Factor=0 Hr 5 Min 0 sec	Low Power Factor=0 Hr 5 Min 0 sec	PF≤ 0.5	PF>0.6
		Power On Off=0 Hr 5 Min 0 sec	Power On Off=0 Hr 5 Min 0 sec	Actual V- off	Actual V- On
		High Voltage=0 Hr 5 Min 0 sec	High Voltage=0 Hr 5 Min 0 sec	Voltage >130% of Vref.	Voltage <110% of Vref.
		High Neutral Current=0 Hr 5 Min 0 sec	High Neutral Current=0 Hr 5 Min 0 sec	Ir + Iy + Ib + In > 20%	Ir + Iy + Ib + In < 10%

Note: "Meter shall have neutral CT for tamper identification and analysis."

Meter shall be provided with feature for terminal cover opening with time stamping.

4.37.2 The meter shall record in export registers in case of reversal of CT terminals(either 1, 2 or 3) . The meters are to be used for registration of energy consumed by the consumer, as such the meters shall be programmed for import mode and in case of reversal of energy direction (reversal of either 1,2 or 3 CT terminals) meter shall register energy separately in export mode i.e. in case of CT reversal ,meter shall record scalar (not vector sum) sum of energy.

4.37.3 The meter shall register correctly if supply neutral is not available at the meter neutral terminal. The meter shall work in absence of any phase. It shall keep recording correctly in case of unbalance system voltage also as defined above.

4.37.4 The meter shall keep working accurately irrespective of the phase sequence of the supply. The meter shall be functional even if somehow change in the phase sequence takes place. Meter shall sufficiently record this feature.

4.37.5 The meter shall be reprogrammable at site through CMRI or remotely with adequate security level of DT meter.

4.37.6 Minimum 08 DI&02 DO required (Extendable upto 12 each type for future requirement) to communicate with DT/Breaker/Isolators/FPI ,sensors etc.

5.0	**GENERAL CONSTRUCTIONAL REQUIREMENTS**

5.1 General

The Meter shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal conditions, so as to ensure especially personal safety against electric shock, safety against effect of excessive temperature, protection against spread of fire, protection against penetration of solid objects, dust and water.

All parts, which are subject to corrosion under normal working conditions, shall be protected effectively. Any protective coating shall not be liable to damage by ordinary handling or damage due to exposure to air, under normal working conditions.

The meters shall be designed and manufactured using SMT (Surface Mount Technology) components
All the material and electronic power components used in the manufacture of the meter shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy as given below or any other equivalent make with the strict approval of TPCODL:

S No	Component Function	Requirement	To be furnished by bidder
1.	Measurement/ computing chips	The Measurement/ computing chips used in the meter should be with the Surface mount type along with the ASICs	
2.	Memory chips	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	
3.	Display modules	The display modules should be well protected from the external UV radiations. The display visibility should be sufficient to read the meter mounted between height of 0.5m and 2m. The construction of the modules should be such that the displayed quantity should not disturbed with the life of display. (Pin Type) It should be trans-reflective STN type industrial grade with extended temperature range.	
4.	Optical port	Optical port should be used to transfer the meter data to meter reading instrument. The mechanical construction of the port should be such to facilitate the data transfer easily.	
5	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	
6.	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.	
7.	Battery	Lithium with guaranteed life of 15years	
8.	RTC / Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	

5.2	**Meter Body**	Meter body shall be made of unbreakable, high grade, fire retardant reinforced Insulating material(protective Class II) with FVo Fire Retardant, self -extinguishing, UV stabilize, recyclable and Anti oxidation properties.The minimum thickness of the meter enclosure shall be 2mm.Meter base shall be opaque of Green color with polycarbonate LEXAN 500R or equivalent on prior approval from the TPCODL. Meter cover shall be transparent with polycarbonate LEXAN 143R/943A or equivalent on prior approval from the TPCODL. Meter cover & base shall be provided with continuous and seamless Ultrasonic welding / Chemical Welding such that it is not opened without breaking the enclosure. Front cover & base shall be such that it is not possible to cut & open the meter without certainly damaging the meter body and by no means shall an attempt to reassemble would not leave physical evidence. The meter body shall be sealed in such a way that opening of meter base and cover is possible only after breaking the seal(s). Unidirectional screws to be used on meter covers where ever required. Meter PCB chamber should be hermetically sealed and pins for connecting NIC card should come out from this hermetically sealed compartment in an adjoining slot where NIC card can be push fit and sealed using TPCODL sealing arrangement.
5.3	**Terminals, terminal Block**	Terminals may be grouped in terminal block having adequate insulating properties and mechanical strength. In order to satisfy such requirements when choosing insulating materials for the terminal block adequate testing of materials shall be taken into account. Terminal block and terminal cover shall be of a material which complies with the requirements of IS11731 (part 1) method FH1. The material of which the terminal block is made shall be capable of passing the test given in ISO 75 for temperature of 135°C and pressure of 1.8 M Pa. The terminal block shall be of opaque with polycarbonate LEXAN500R. The terminals and connections shall be suitable to carry up to 120 % of Imax continuously The terminal block, the terminal cover and the meter case shall ensure reasonable safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them. The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there is no risk of loosening or undue heating. Internal diameter of the terminal holes shall be minimum 5.5 mm; minimum clearance between adjacent terminals shall be 10 mm. Depth of the terminal holes shall be of 25 mm. Terminal block shall be such that the risk of corrosion resulting from contact with any other metal part is minimized. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material.
5.4	**Terminal Cover**	Terminal cover shall be of short type and shall be transparent with polycarbonate LEXAN 143R/943A. Appropriate space shall be available for incoming / out going cables without damaging/stressing terminal cover (terminal cover design shall be got approved from TPCODL). After sealing the cover, terminals shall not be accessible without breaking the seals.
5.5	**Sealing of meter**	Reliable sealing arrangement shall be provided to make the meter tamper evident and to avoid fiddling or tampering by unauthorized persons. For this, one no. Polycarbonate seal and one no. Hologram seal shall be provided by TPCODL. One no polycarbonate seal and one no. hologram seal shall be provided by the bidder. All the seals shall be fixed on meter body by the bidder at his works before dispatch. One sealing provision shall be provided at meter terminal cover, such that terminal shall not be accessible without breaking the seals. All the seals shall be provided on front side only and as per TPCODL specification. Rear side sealing arrangement shall not be accepted. Bidder shall provide seals be as per CEA regulation (2006) . Plug in type NIC card should have proper sealing arrangement.

5.6	**TOD Feature**	The meter shall be capable of measuring Cumulative Energy (KWh &KVAh), and MD (KW & KVA) with time of day (TOD) registers having 8 zones & 02 seasons (no. of zones & time slot shall be programmable by CMRI with adequate security level and in one to one /broadcast mode over the air). Midnight snap shot of TOD value also required (Optional). Current TOD to be given during tender. Slots | Time Slot | Jan-Dec Off-peak | 0000-0600 | Register 1 Normal | 0600-2400 | Register 2
5.7	**MD integration**	The MD integration period shall be 15 minutes (integration period- programmable by CMRI at site and also through remote with adequate security level. The MD resetting shall be automatic at the 1st of the month i.e 00:00 hours of 1st of the month. Manual MD reset button shall not be available. Last six MD values shall be stored in memory and four to be displayed in auto scroll mode. MD shall be recorded and displayed with minimum two digits after decimal points. MD integration shall be of sliding method, not in time block OEM should provide all required features as per OERC billing criteria in meter even if it is not mentioned in the specifications.
5.8	**Load Survey**	The meter shall be capable of recording 15 minutes average of the following parameters for at least last 60 days **1)** Voltage of each phase **2)** Current of each phase **3)** PF of each phase **4)** KWh of each phase **5)** Total KWh **6)** Total KVAh **7)** KVArh(Lagging) **8)** KVArh(Leading) **9)** Demand KW **10)** Demand KVA **11)** Neutral Current **12)** Vector diagram(three voltages & four currents) **13)** Frequency **14)** THDV **15)** THDI Note- Meter shall record consumption in forward mode in case of any CT reversal. Load survey data should be at least with 5 decimal place.
5.9	**Display Unit**	The display unit shall be Pin type built-in liquid crystal display (Permanently backlit type LCD). The LCD shall be of STN (Super Twisted Nematic) construction suitable for maximum temperature withstands 65 C degree and minimum temperature withstands 0 degree C during normal operating condition. The LCD display shall have a wide viewing angle of 120 degree. When the meter is not energized the electronic display need not be visible. The display shall not be affected by electrical and magnetic disturbances. The display should be readable in direct sunlight. The KWh &KVAh register shall have minimum 8 digits and size of the digits shall be minimum 10mmx5mm. Cumulative energy (KWh &KVAh) shall be displayed without decimal in auto scroll mode. (However decimal shall be available in push button mode for high resolution display for testing) **5.9.1 Auto scroll mode:**

Persistence time for each parameter shall be 10 second. Values followed by header shall be avoided. (i.e. if MD1 is displayed in Auto scroll mode, Header (as given in ix below) and value (say 5.23 KW) shall be shown simultaneously; it shall not be shown in successive displays. Off time shall not be available in auto scroll mode between each cycle. Auto scroll mode is restored after 10 sec, if push button is not operated.

Following shall be continuously displayed in auto scroll mode in the given order;

1) LCD segment check(all elements and 7 segments on display will be ON)
2) Present date and time
3) NIC card failure

Sr. No.	Auto Scroll Display
1	LCD CHECK
2	Meter Sr. No.* > Complete Meter Serial no. should be there in single shot.
3	dd:mm:yy
4	hh:mm:ss
5	KWh reading on 1st of last month at 00.00 hrs.
6	KWh reading on 1 st of second last month at 00.00 hrs
7	KVAh reading on 1st of last month at 00.00 hrs
8	KVAh reading on 1st of second last month at 00.00 hrs.
9	MD KW MD in KW on 1st of last month at 00.00 hrs.
10	MD KW MD in KW on 1st of second last month at 00.00 hrs
11	MD KVA MD in KVA on 1st of last month at 00.00 hrs
12	MD KVA MD in KVA on 1st of second last month at 00.00 hrs.
13	Average power factor of entire month on 1st of last month at 00.00 hrs
14	Average power factor of entire month on 1st of second last month at 00.00 hrs
15	Current Cumulative KWh
16	Current Cumulative KVAh
17	Current Cumulative KVARh(lag).
18	Current Cumulative KVARh(lead).
19	Current MD - KW
20	Current MD - KVA
21	MD reset count
22	R Phase Voltage (Instantaneous value).
23	Y Phase Voltage (Instantaneous value).
24	B Phase Voltage (Instantaneous value).
25	R Phase Current (Instantaneous value).
26	Y Phase Current (Instantaneous value).
27	B Phase Current (Instantaneous value).
28	Instantaneous power factor
29	Instantaneous load in KW
30	Instantaneous load in KVA

5.9.2 Push Button Mode:

Following parameters shall be displayed in Push button mode in the given order after display of all the tamper events

Sr. No.	Push Button Display
1	LCD CHECK
2	Meter Sr. No.* > Complete Meter Serial no. should be there in single shot.
3	dd:mm:yy
4	hh:mm:ss
5	KWh reading on 1st of last month at 00.00 hrs.
6	KWh reading on 1 st of second last month at 00.00 hrs
7	KVAh reading on 1st of last month at 00.00 hrs
8	KVAh reading on 1st of second last month at 00.00 hrs.
9	MD in KW on 1st of last month at 00.00 hrs.
10	MD in KW on 1st of second last month at 00.00 hrs
11	MD in KVA on 1st of last month at 00.00 hrs
12	MD in KVA on 1st of second last month at 00.00 hrs.
13	Average power factor of entire month on 1st of last month at 00.00 hrs
14	Average power factor of entire month on 1st of second last month at 00.00 hrs
15	Current Cumulative KWh
16	Current Cumulative KVAh
17	Current Cumulative KVARh(lag).
18	Current Cumulative KVARh(lead).
19	Current MD - KW
20	Current MD - KVA
21	Instantaneous load in KW
22	Instantaneous load in KVA
23	Instantaneous power factor
24	MD reset count
25	R Phase Voltage (Instantaneous value).
26	Y Phase Voltage (Instantaneous value).
27	B Phase Voltage (Instantaneous value).
28	R Phase Current (Instantaneous value).
29	Y Phase Current (Instantaneous value).
30	B Phase Current (Instantaneous value).
31	R phase power factor(Instantaneous value).

		32 Y phase power factor(Instantaneous value). 33 B phase power factor(Instantaneous value). 34 Phase Sequence voltage & current 35 self diagnostic check 36 Cumulative MD-KW 37 Cumulative MD-KVA 38 Rising Demand in KW with elapsed time 39 Rising Demand in KVA with elapsed time All these parameters shall be downloaded locally or remotely and interpreted in PC/Laptop. All the parameters shall be recorded and memorized in its Non volatile Memory (NVM). The corresponding non volatile memory shall have a minimum retention time of 10 years. Last six months history data (KWh &Kvah) reading and MD(KW & KVA) with data and time) and at least last six tamper events for each tamper shall be available in the non volatile Memory.
5.10	**Output Device**	**5.10.1 Pulse Output:**The meters shall have a suitable test output device. 2 nos of Red color blinking LED (marked as imp/kWh and imp/Kvah) shall be provided in the front. This device shall be suitable for using with sensing probe used with test benches or reference standard meters. The test output device shall have constant pulse rate preferably of 400 pulse / kWh & 400 pulse/Kvah**.** Meter constant shall be indelibly printed on the name plate **5.10.2 Communication LED-** The meter shall be provided with Green color LED for RxD and orange color LED for TxD communication in progress **5.10.3 Mid Night Values** : Meter should have mid night log for KWh, KVAh,KVArh lag, KVArh lead and TOD readings for last 60 days.
6.0	**Name plate and Marking:**	Meters shall have a name plate clearly visible and effectively secured against removal. Indelibly and distinctly marked with all essential particulars as per relevant standards along with the following. i. Manufacturer's name ii. Type designation iii. Number of phases and wires iv. Serial number v. Month and Year of manufacture vi. Unit of measurement vii. Reference voltage ,frequency viii. Ref. temperature if different from 27 deg. C ix. Rated basic and maximum Current x. Meter constant (imp/kWh) xi. 'BIS' Mark xii. Class index of meter xiii. "Property of TPCODL xiv. Purchase Order No. & date xv. Guarantee period. xvi. Rated frequency xvii. Sign of double square xviii. Country of manufacture xix. Communication Tech for WAN and NAN (with carrier frequency) xx. Communication Technology is IHD supported (with carrier frequency)

		However the following shall be printed in bar code on the meter nameplate. i. Manufacturer's code No.(given by TPCODL) ii. Meter Sr. No iii. TPCODL Property **iv.** Month/Year of manufacture. **v.** However the following shall be printed in bar code on the meter nameplate(shall be laser printed on name plate instead of any sticker). All data shall be laser printed on meter along with Sr.NO and date of manufacturing. No sticker to be used to avoid loss of data in event of fire. Content Format for bar code: **TPCODL MMYY XXXXXXXXX** (9-digit Serial no.) The PCB Serial number should be printed on the PCB instead of sticker. **Bidder should ensure that each NIC provided in meters are having laser printed Sr. No., MFG date, 'Property of TPCODL' marked, PO date and no. (same as that of meter PO)**
7.0	**TESTS**	All routine, acceptance & type tests shall be carried out on the meter and meter body separately in accordance with the relevant IS/IEC. All routine/acceptance tests shall be witnessed by the purchaser/his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted in addition to the tests specified in IS/IEC
7.1	**TYPE TEST**	1. All tests as defined in IS 14697:1999/ IS 15959(Part-2):2016 2. Type test of the Material used for Terminal Block and meter body as per relevant standards.
7.2	**ROUTINE TEST**	1. AC High Voltage test 2. Insulation test 3. Test on limits of error 4. Test of starting current 5. Test of no load condition
7.3	**ACCEPTANCE TEST**	1 AC High Voltage test 2 Insulation test 3 Test on limits of error with loads

120% I max (12A)	I max(10A)	Ib(5A)	0.5Ib(2.5A)	0.1 Ib(0.5A)	0.05 Ib(0.25A)
UPF,0.8 lead & 0.5 lag	UPF,0.8 lead & 0.5 lag	UPF,0.8 lead & 0.5 lag	UPF,0.8 lead & 0.5 lag	UPF,0.8 lead & 0.5 lag	UPF

4 Test of meter constant
5 Test of starting current
6 Test of no load condition
7 Test of repeatability of error.
8 Test of power consumption.
9 Test to influence of harmonics
10 Supply voltage and frequency variation test
11 Testing of self diagnostics features and tamper count increment and logging with date & time

7.4	**SPECIAL TEST**	The bidder shall demonstrate the communication capability of the meter through communication modes as defined in the specification before conducting acceptance tests. The bidder shall ensure that API (Application protocol interface) is compatible with TPCODL'S CFW.
8.0	**Type Tests Certificates**	The bidder shall furnish the type test certificates of the meter for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI or equivalent as per the relevant standards. For communication testing any national approved laboratory or international acclaimed lab or equivalent will also suffice at the discretion of TPCODL. Type test should have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPCODL.
9.0	**Pre-Dispatch Inspection**	The successful bidder shall submit five prototype samples for further testing and compliance as per specifications and getting approval before mass manufacturing. Inspection may be made at any stage of manufacture at the discretion of the purchaser of the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Equipment shall be subject to inspection by a duly authorized representative of the TPCODL. Bidder shall grant free access to the places of manufacture to TPCODL's representatives at all times when the work is in progress. Inspection by the TPCODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCODL. Following documents shall be sent along with material a)Test reports b)MDCC issued by TPCODL c)Invoice in duplicate d)Packing list e)Drawings & catalogue f) Guarantee / Warrantee card g)Delivery Challan h)Other Documents (as applicable) i) One no. leaflet with each meter Out of five samples, four samples to be submitted in Meter testing lab and one in Plant Engineering. NOTE- Photographs of packed lot clearly showing s.no of meters whose inspection call has been requested should be sent along with letter for inspection call.
10.0	**INSPECTION AFTER RECEIPT AT STORE**	The material received at TPCODL's store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Plant Engineering department.

11.0	GUARANTEE	Bidder shall stand guarantee towards design, materials, workmanship & quality of process / manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the purchaser up to a period of at least 60 months from the date of commissioning or 66 months from the date of last supplies made under the contract whichever is earlier. Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Company, failing which the purchaser will be at liberty to get it replaced/rectified at bidder's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the bidder or from the " Security cum Performance Deposit" as the case may be. Bidder shall further be responsible for 'free replacement at site' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the purchaser
12.0	PACKING	1.Bidder shall ensure that all material covered under this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit. The material used for packing shall be environmentally friendly. Packing and transportation shall be as per IS 15707:206 clauses 9.1 and 9.2. Routine test report of the individual meter shall be kept inside each card board carton of the meter. Each meter should be packed in separate cardboard box and these meters can then be furthered packed into bigger boxes which will contain 10 meters arranged in S.no. **Leaflet**:-The Vendor shall supply 1 no. leaflet with each meter. The leaflet shall be colored and shall contain General features and specifications as per TPCODL requirement. A picture of the meter shall be printed on the leaflet. Prior to delivery, the vendor need to submit the same for approval.
13.0	TENDER SAMPLE	Bidders are required to manufacture 03 sample meters as per the Purchaser specification (sealed, unsealed and openable base and cover to view/test the inner circuits)and submit the sample along with bid for approval. Following accessories to be submitted along with sample 1) Detailed manual 2) Communication cords 3) Tamper logic sheet 4) Display parameter annunciator 5) BCS and 6) Internal connection diagram. Bidder to demonstrate all communication features during sample testing.
14.0	Quality Control	The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. Quality should be ensured at the following stages: • At PCB manufacturing stage, each board shall be subjected to computerized bare board testing. • At insertion stage, all components should under go computerized testing for conforming to design parameter and orientation. • Complete assembled and soldered PCB should under go functional testing using Automatic Test Equipment (ATEs). • Prior to final testing and calibration, sample meters shall be subjected to aging test (i.e. meters will be kept in ovens for 72 hours at 55 Deg. C temperature and atmospheric humidity under real-life condition at its full load current. After 72 hours meter should work satisfactorily) The Purchaser's engineer or its nominated representative shall have free access to the bidder's/manufacturer's works to carry out inspections.

15.0	MINIMUM TESTING FACILITIES	Bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards. The bidder shall have duly calibrated Reference Standard meter of Class 0.05 accuracy.
16.0	MANUFACTURING ACTIVITIES	The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart shall be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order
17.0	SPARES, ACCESSORIES & TOOLS	40 nos of optical cord for retrieving the data of meter through optical port should be provided, if design of optical port is changed from those of previously supplied meters.
18.0	DRAWINGS	Following drawings & Documents shall be prepared based on TPCODL specifications and statutory requirements and shall be submitted with the bid: a. Completely filled-in Technical Parameters. b. General arrangement drawing of the meter c. Terminal Block dimensional drawing d. Mounting arrangement drawings. e. General description of the equipment and all components with makes and technical requirement f. Type Test Certificates g. Experience List h. Manufacturing schedule and test schedule Drawings/documents to be submitted after the award of the contract:

S. No.	Description	For Approval	For Review Information	Final Submission	Final Submission
1	Technical Parameters	√		√	√
2	General Arrangement drawings	√		√	√
3	Terminal block Dimensional drawings	√		√	√
4	Mounting arrangement drawing.	√		√	√
5	Manual/Catalogues		√		
6	Transport/ Shipping dimension drawing		√	√	√
7	QA &QC Plan	√	√	√	√
8	Routine, Acceptance and Type Test Certificates	√	√	√	√

All the documents & drawings shall be in English language.
After receipt of the order, the successful bidder shall be required to furnish five copies of all relevant drawings for TPCODL approval.

19.0	GUARANTEED TECHNICAL PARTICULARS	

S.No	Description	Units	As Specified by TPCODL	As Furnished by Bidder

			1	Operating Voltage	V	Meter shall be operational with required accuracy from 0.6 Vref to 1.2 Vref.
			2	Operating Frequency	*Hz*	*50* ± 5%.
			3	Ib& Imax	A	Ib=5A, Imax-10 Amps
			4	Power consumption	VA	As per Cl.4.7
			5	Accuracy Class		0.5s
			6	Starting Current	mA	5 mA(0.1% of Ib)
			7	Short time over current(Secondary)	A	200A for 0.5 sec(20 Imax for 0.5 sec)
			8	Impulse withstand & AC withstand Voltage	KV	6 & 4
			9	Minimum Insulation resistance a) Between frame & Current, voltage circuits connected together: b) Between each current (or voltage circuit) & each and every other circuit.	M ohm	a) 5 b) 50
			10	Degree of protection		IP 51, but without suction in meter
			11	Power factor range		Zero lag to Zero lead
			12	Energy measurement		Fundamental + harmonics
			13	Self diagnostic feature		As per specification.
			14	Communication capabilities as per clause 4.36		As per Specification.
			15	DI/DO as per Cl 4.37.6		Yes/no
			16	Meter body		a) Ultrasonic/Chemical welding shall be provided between cover and base. b) Base: opaque – LEXAN 500R or equivalent. c) Cover: transparent– LEXAN 143R/ LEXAN 943A.or equivalent.

					d) min. 2mm thickness e) Colour-Green	
			17	Tamper/ abnormal count		Tamper count shall be increased incase of all tamper events as defined in 4.37
			18	Recording forward energy in case of current/potential reversal.		Meter shall record forward energy in all conditions as given in clause 4.37
			19	Components used in the meter.		Components shall be of requirement stated and bought from reputed make as defined in clause 5.1. Details shall be submitted along with the bid.
			20	Terminal block		As per Specification.
			21	Depth of the Terminal holes	mm	25 mm (minimum)
			22	Internal diameter of terminal holes	mm	5.5 (minimum)
			23	Clearance between adjacent terminals	mm	10 (minimum)
			24	Material of the terminal block		a)Terminal Block : LEXAN 500R or equivalent b)Terminal Cover : LEXAN 143R/ 943A or equivalent
			25	Non Volatile memory		Minimum 10 years retention period.
			26	Measuring elements used in the meter		To be furnished be bidder
			27	Power supply to circuit (Through common CT/Battery)		Bidder to furnish complete Details.
			28	Display of measured values		As per specification
			29	LCD display		Pin type built in LCD. Shall be of STN, Industrial grade. Viewing angle is 120 degree. Properties/ test reports of the display shall be submitted by the bidder.
			30	Pulse rate	Imp/ KWh Imp/ KVAh	To be furnished by bidder.
			31	Name plate marking		As per Specification

32	Type test		As per specifications	
33	Acceptance test		As per specifications	
34	Routine test		As per specifications	
35	Test reports		Meter shall be packed along with individual routine test report, while dispatching.	
36	Guarantee		As per specification	

ANNEXURE-II

PART-B

TECHNICAL SPECIFICATION FOR

SITC OF UNIFIED HEAD END SYSTEM AND 4G/ LTE BASED COMMUNICATION FOR DEPLOYMENT OF AMI SYSTEM AT TPCODL

UNDER

SMART METERING SOLUTION

Tender Enquiry No.

TPCODL/ P&S/ 167 (Part-B)/ 2020-21

Tender for SITC of Unified Head End System and 4G/ LTE based Communication for deployment of AMI System at TPCODL

Table of Contents

Abbreviations:

AMI	Advanced Metering Infrastructure
AMR	Automated Meter Reading
BoQ	Bill of Quantities
DLMS	Device Language message specification
FAT	Factory Acceptance Test
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
HES	Head End System
IEC	International Electro technical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
MDMS	Meter Data Management System
OEM	Original Equipment Manufacturer
SAT	Site Acceptance Test
SNMP	Simple Network Management Protocol
TCP	Transmission Control Protocol
VLAN	Virtual LAN
WAN	Wide Area Network
WPC	Wireless Planning & Coordination Wing
NCIIPC	National Critical Information Infrastructure Protection Center

1 Background

1.1 Introduction

Tata Power Central Odisha Distribution Limited (TPCODL) is incorporated as a joint venture of Tata Power (51%) and Odisha Government (49%) on the Public-Private Partnership (PPP) model. TPCODL took over the license to distribute electricity in the central part of Odisha, which was earlier served by erstwhile CESU. TPCODL commenced its power distribution operations in Central Odisha area from 1st June 2020.

TPCODL license area is spread over a geography of 29354 Sq.Km and serve the registered consumer base of 2.6 million covering 9 Revenue Districts of Odisha State, namely: Cuttack, Puri, Dhenkanal, Angul, Khurda, Kendrapara, Nayagarh, Jagatsinghpur and part of Jajpur.

TPCODL is in the process of deploying Advance Metering Infrastructure (AMI) throughout its territory. The scope of work includes to provide a Head End System that has the ability to communicate with all Cellular network platform that can support AMI system over a single communications platform.

The purpose of this RFP is to find a suitable technology solution to meet TPCODL's requirements that provide for some level of future proofing, while at the same time dealing with the company's specific issues relating to revenue protection and last mile connectivity.

2 Scope of Work

The main objective of HES is to acquire meter data automatically avoiding any human intervention and monitor parameters acquired form meters. The HES implementation bidder shall provide the HES suitable to support the collection and storage of data as per performance level for 2,50,000 smart meters and scalable up to 0.5 million smart meters.

HES shall be hosted on cloud.

- The Bidder shall supply and commission HES that shall have capability of storing and processing of data exchange with 20 different variants of various meter OEM supplying meters to TPCODL (Smart meters operational in Pre-paid/Post- paid, Import/Export mode are to be considered as a single variant).

- HES would perform all the requisite functions as per defined functionalities of AMI and it is the responsibility of the HES provider to supply the requisite Software and Hardware to achieve the defined functionalities of AMI.

- HES shall be maintained by Bidder during commissioning and for 7 years from date of commissioning.

- HES Shall Support storage of raw meter data, alarm and alerts for minimum 45 days for 2.5L meters from day 1.

- HES shall have the capability to receive or pull all meter related data as specified in latest versions of IS 16444 and IS 15959, IS15959 Part 2 & 3 and further store the same in HES's database.

- HES shall integrate with existing TPCODL's IT OT systems like MDMS, SCADA, SAP, iNMS and as the use cases specify

- Head End System should have uptime of 99.9%. Suitable reports to be submitted on monthly/quarterly basis.

3 Functional Requirements

- HES should be interoperable with different 4G/LTE network providers (bidder to submit back-to back agreement with TSP's minimum 4 nos.)

- The HES must report real time data reading as stored in meter memory, calculated consumption and events to the MDM system.

- Bidder shall provide web based interface for remote management, monitoring and control of all communication network, including the tracking of necessary system component.

- The head-end system shall support **self-discovery** and **self-registry** functionality to detect and register meters within 60 minutes of meter connection. Devices shall register themselves in head-end application upon its deployment and establishment of communication.

- Maintain time sync with meter.

- All parameters as per Meter Specifications should be catered to by HES.

- The head end system shall support on-request reading of any available information by meter/customer or batch of meters/customers and push it to MDMS on immediate basis without waiting for next schedule push..

- The head end system shall provide

    - Outage detection notification and power restoration notification information in support of enhanced outage management and improved customer satisfaction.

    - Setting of Smart meter configurable parameters

    - Signals for connect & disconnect of switches present in end points like meter

- The head end system should support the load limiting functionality.

- HES shall enable the utility to upgrade Firmware in the communication devices/meters over the air (OTA) in batch mode in bulk.

- HES shall have functionality of Gap reconciliation process for Billing data , Daily mid night data, Interval data from the meter on the basis of meter type and for all metering parameters from Meter (Billing and Non billing parameters) as defined by TPCODL. Look back period should be configurable.
- All Billing data, Daily mid night data, Interval and Event data should be available in Push mode by default and on pull mode (On Demand Read) based on the data available in the memory of the meter
- Functionality of firmware upgrade of meter or NIC over the air (OTA) should be available from HES.
- HES shall retry the firmware upgrade for specified no. of times in case of failure on the first attempt and should be able to populate the report of firmware upgrade.
- Provision for accessing the database directly by other third party applications hosted at TPCODL Data Center through authorization should be provided.
- Functionality of Role based and area wise access to the UI screens
- HES should have tools to measure the network performance and SLA compliance and should be able to populate reports.
- All interfaces should be compatible with existing standards of IEC 61968 – 9 and Multi speak
- HES should have ability to identify and resolve any firmware mismatch issues in the meter, NIC and other network elements
- HES shall comply with DLMS protocol on receiving meter data
- HES shall also support the Meter manufacturer specific and utility specific OBIS codes to receive and store the meter data in HES and further
- HES shall accept meter data downloaded from the smart meters through CMRI or any other reading tools
- HES shall identify the source of reading / data in the system as either through AMI path or any other reading tools
- Billing Support. The head end system shall support on-cycle and off-cycle billing reads.
- Diagnostic and Performance Report. The system shall provide daily, weekly and monthly performance reports tracking equipment failures, communications failures, and data latency for all customer and equipment classes. Reports shall be generated in common commercially available reporting tools.
- Energized Check. The head end system shall support meter energization checks (on-demand pings) by meter/customer or batch of meters/customers.
- The head end system shall support on-request reading of any available information by meter/customer or batch of meters/customers (On-Demand Read).
- The head end system shall support revenue integrity monitoring across the entire meter/customer population including, but not limited to, meter tamper, energy diversion, site diagnostics, and load diagnostics.
- The head end system shall provide outage detection notification and power restoration notification information in support of enhanced outage management and improved customer satisfaction (Outage Management)
- The head end system shall support the physical disconnect/reconnect functionality. **Disconnection command should be restricted to 100 connection in one batch of mass execution**
- Load Limiting. The head end system should support the load limiting functionality.

- The head end system should provide web-based user interfaces.
- Pre-Payment (mandatory). The head end system should support pre-payment capabilities.
- The HES system should comply with the communication protocol as defined in IS standard 16444 and IS 15959, IS15959 Part 2 & 3 (for data exchange for electricity meter reading tariff and load control) including latest amendments.
- The HES shall have an excellent capability of reporting all sorts of status, alerts and transactions for both AMI management on real time as well as historical basis.
- The HES shall be flexible and on open standard so that it can communicate with third party communication devices. The HES shall support web based multiple data base support software and also support standard integration Multi-speak and CIM IEC 61968 for third party MDMS.
- For any version upgrade bidder need to provision required Infra for Test and Development environment.
- Data Validation and Exception Handling
    - The system shall detect and prevent logical data errors when the data is inputted either by user entry or from other systems.
    - Any data error shall not affect system functions that are not directly associated with it.
    - The system should generate an error code and description which can be used to help facilitate debugging end user problems. Error code must be referenced to the actual exception generated.
- Configuration (HES shall facilitate programming of following meter parameters)
    - Load profile capture period
    - Demand intigation period
    - Setting of parameters for TOD/TOU billing
    - Prepaid function
    - Net Metering
    - Billing date.
    - Clock setting /time synchronization
    - Event setting for connect/disconnect
    - Number of auto reconnection attempts
    - Time interval between auto reconnection attempt
    - Remote firmware upgrade
    - Password settings
    - Push Schedule

- Setting of threshold limit for monitored parameters

3 HES Modules:

The HES shall have the following in-built module:

i). **AMI module:** This module shall support automatic meter reading, revenue management, remote connect/disconnect, load control, peak pricing, demand side management, Secure management for all types of signals/alerts to endpoint devices/from the end points, data gap reconciliation (i.e., gap detection, gap collection and gap retry), street lighting management & reporting.

ii). **Security module:** This is an additional module, attached to the HES, for secure storage & processing of security keys & certificates.

iii). **Firmware Upgrader:** This shall enable the utility to upgrade Firmware in the communication devices/meters over the air (OTA) in batch mode in bulk.

iv**). Network Management Module (NMM):** The HES shall indicate summary status by service type/ device type and events type, with the following features:

- Centralized management for AMI networks
- Advanced configuration & visualization
- Real time & historical information
- Support external interfaces
- Auto registration & self-healing
- Dynamic network discovery
- Backhaul flexibility & redundancy
- Network provisioning
- Performance monitoring
- Trouble shooting
- Security management

Network management system, inbuilt in the HES, shall be on open standard and shall support third party network equipment.

vi). Outage Management System module (OMS): The HES system shall have outage management module for easy identification of the end points without power, instantly, for quick restoration using the last gasp feature of the communication devices. The alarm will be logged by the head end, displayed on the GUI, and optionally shall send SMS to the appropriate owners/users.

vii). Power Quality Monitor (PQM): Power quality related information such as voltage, frequency and harmonics can be visualized device wise/ area wise with the help of this module.

4 4G Connectivity (with fall back on 2G) & Lease Line SOW for Smart Metering

1. Bidder to ensure Lease line connectivity at TPCODL control centers
2. Monthly Availability for each lease line should not be less than 99.95%.

3. Packet loss on the Leased Line not to exceed .5%.
4. Bandwidth provisioned shall be symmetric and sufficient to cater meter data from HES (Hosted in cloud) to TPCODL Data center
5. Round trip time delay shall be below 150 ms from APN based SIM to TPCODL Control center
6. Jitter shall be below 10% of the round trip time
7. It is strongly preferred that the local loop medium is fiber optic.
8. Bandwidth provisioned for leased line should be adequate enough to meet SLA as per tender.
9. Bidder shall undertake installation & configuration of modems, routers or any such associated Fiber-optic equipment to make the entire system working as per SOW.
10. All necessary clearances shall be the sole responsibility of Bidder. Successful bidder shall be responsible for getting the necessary permission from local & government agencies/regulatory bodies for laying of cables, digging of roads, restoration etc. and other infrastructure required for the project. No additional cost /charges would be payable by the purchaser as the connectivity is on rental / lease basis only.
11. Bidder would ensure that the provisioning does not violate regulations as laid by Government of India / DoT / TRAI / others in respect of such links / networks.
12. Bidder would ensure adherence of Service Level Agreement. Bidder should submit the monthly report of all the link w.r.t all SLA parameters to the purchaser latest by 5th day of next month.
13. Bidder to provide the Self Care NMS Portal to check the Bandwidth Utilization, Latency & Jitter for MPLS backhaul link.
14. SITC of Complete Hardware, software, Accessories etc. required for termination of Leased line connectivity is under SCOPE of Bidder.
15. Laying of fibre if required is also in scope Bidder.
16. Bidder should have the capability of increasing / decreasing bandwidth on demand and should be willing to change the bandwidth up or down on demand.
17. The backbone architecture of the bidder should be in Fiber Ring with self-healing capability. The backbone should be bidder's own infrastructure and not in a shared fashion. A self-declaration document to be submitted by bidder in this regard along with bid document.
18. Bidder to ensure N-1 network availability for last-mile communication network at data centers.
19. The Bidder shall provide separate compliance statement for each of the requirements mentioned above in the eligibility criteria and warranty.
20. APN should support connectivity that supports SIT protocol 41, UDP, SSH & NTP, ICMP.

21. Bidder to ensure end to end Data security for the supplied solution. Bidder to submit compliance report for same post execution. TPCODL reserves the right to carry out end to end penetration testing through 3rd party.
22. Lease line should support connectivity that supports VPN(IPSEC)
23. Bidder should provide the solution document & detail architecture along with bid document.

SIM Card Management :

- 4G network should have flexibility to use alternate routing when main link/network fails.
- 4G network should have fall back on 2G network.
- TPCODL requires connectivity at 2,50,000 end points scalable upto 0.5 M end points .
- Bidder needs to provide Set up an APN that provides a static IPV4/IPV6 address to the SIM.
- SIM provided by Bidder should be of industrial Grade.
- APN should support connectivity that supports VPN(IPSEC)
- At any point of time Latency from TPCODL Control to SIM should not be more than 150 ms.
- SIM MTTR shall be < 2 hrs.
- All SIMs supplied shall be APN enabled SIM cards.
- Voice and SMS feature shall be disabled.
- Open internet / public APN shall be barred for security reason.
- SIM cards shall be as per latest Industry standard
- The SIM must be able to work in 4G networks.
- SIM should have IMEI tracking applet for device management applications.
- SIM should provision with preconfigured service provider APN details along with supporting applet, which should automatically push the APN data.
- The applet should support most of the gateway make/models.
- SIM shall have support for remote file updates, network specific authentication data
- Bidder will need to provide static private IP address for each M2M SIM.
    - BIDDER to provide the SIM Management Platform for checking the inventory of SIM Cards, Active SIM Cards etc.
- Bidder needs to Provide/complete following information:
    i. SIM card Inventory –In stock rejected /Suspended/Terminated SIMs
    ii. SIM details mapping With M2M Gateway before installation
    iii. Compliance as per DoT/TRAI
    iv. Alarm of SIM installation /Network Condition
    v. Replacement of Faulty SIM and SLA
    vi. SIM activation before installation

vii. Location of Installation of SIM

viii. Associated with Installation of SIM

ix. Installation of Schedule (Lat/Long/Geographic area)

x. Maintenance and Post implementation support

Note:

- Bidder to provide SIM Management Platform for activation / deactivation of SIM cards and reporting purpose..
- SIM card to be handed over to TPCODL / Meter OEM on need basis. Provision of testing meters with temporary activation of SIM Cards to be provided. Actual activation to be done at later stage on installation of meters.
- Rental of SIM cards supplied till HES go-live, has to be handled by Bidder.
- SIM should not have voice or SMS facility to avoid any misuse of SIM cards. Any additional service enabled in SIM will be considered as free of cost to TPCODL.
- Tri Partied agreement between TPCODL, Communication Service provider and HES solution provider to be done for ensuring services.

4 Cyber Security

The HES system shall have adequate cyber security measures as detailed below:

1. Secure Access Controls: - The proposed solution should support LDAP integration. The system shall include mechanisms for defining and controlling user access to the operating system environment and applications. Measures such as password policy, password strength, password aging, and password history and reuse prevention must be implemented.

2. Authorization Controls:
   a) A least-privilege concept such that users are only allowed to use or access functions for which they have been given authorization shall be available.
   b) The Client BCS should not require administrative access on Operating System functionalities to operate.
   c) Once the factory default credentials are reset, those should be maintained in sealed envelope by TPCODL IT administrator

3. Logging: Logs must be maintained for all attempts to log on (both successful and unsuccessful), any privilege change requests (both successful and unsuccessful), user actions affecting security (such as password changes), attempts to perform actions not authorized by the authorization controls, all configuration changes etc. Additionally, the access to such logs must be controlled in accordance to the least-privilege concept mentioned above, so that entries may not be deleted, accidentally or maliciously.

4. Hardening:
   a) All unnecessary packages must be removed and/or disabled from the system. Additionally, all unused operating system services and unused networking ports must be disabled or blocked. Only secure maintenance access shall be permitted and all known insecure protocols shall be disabled.
   b) The solution provider should share the pre-requisites such as ports, services, third party components, license, etc. along with their technical proposal

5. Malicious Software Prevention: Implementation of anti-virus software and other malicious software prevention tools shall be supported for all applications, servers, data bases etc.

6. Network Security: The network architecture of the HES must be secure with support for firewalls and encryption. The system shall also allow host-based firewalls to be configured, as an additional layer of security if the network firewall were to fail.

7. The solution provider should comply regulatory requirements (especially Indian) currently and in future including Security, Data privacy and protection. E.g. data should not leave Indian Boundaries, Protection of PII, etc.
8. The solution provider should share controls (including physical) implemented to identify, detect, protect, respond and recover from any malicious activity on offered solution
9. The solution provider should ensure segregation of data from other customers and share controls implemented to restrict access including their internal administrators or support staff
10. The solution provider should elaborate how Safe disposal or destruction of data is monitored during instances of hardware failure or termination of contract
11. Adequate logical segregation of environments should be maintained between TPCODL infrastructure and service provider's infrastructure
12. Mechanism used to address challenges in maintaining a common Identity and Access Management (IAM) solution for all its customers, in case LDAP integration is NOT possible
13. The solution provider should meet the Security Patch and Release management process as per TPCODL requirements or best practices recommended by global standard / OEM
14. The solution provider should share "Exit Strategy", in case TPCODL wants to switch services to other service provider
15. The solution provider should provide assurance that, there are no challenges to audit Tata Power related infrastructure on the cloud / processes
16. The solution provider should ensure regular independent security audits for the cloud infrastructure, applications, facilities, etc. and make these audit reports available to Tata Power highlighting mitigation of gaps identified during these audits
17. The solution provider should share yearly certification to ensure no data exfiltration has happened by any means
18. The solution provider should share backups of the data and system files on a periodic basis, if required by TPCODL
19. Bidder to ensure that there is "Zero" cyber security breach at HES while the data is travelling from meter to the output of HES.
20 Third party cyber security assessment has to be done by bidder through CERT-in certified agency.

HES+ Communication	
Identifier	**Description**
1	**Critical Cyber Asset Identification**
	Solution Provider to share list of cyber assets with TPCODL
2	**Access Authorization Controls**
	The proposed solution shall support measures such as password policy, password strength, password aging, password history and reuse prevention.
	Solution provider shall share list of its personnel who have access to cyber assets, and inform TPCODL within 48 hours of any change of personnel with such access to cyber assets, or any change in the access rights of such personnel.
	For factory default accounts that must remain enabled, passwords shall be changed prior to putting any system into services and must adhere to TPCODL's password policy management. Once the factory default credentials are reset, those should be maintained in sealed envelop by Tata Power IT administrator
	Proposed solution shall comply with an access control model that denies access by default. A least-privilege concept such that users are only allowed to use or access functions for which they have been given authorization shall be available.
3	**Monitoring Electronic Access**
	Solution provider to ensure availability of audit trails and security logs. Proposed solution to generate logs of sufficient detail to create historical audit trails of individual user account access activity for a minimum of three months. Logs must be maintained for all attempts to log on (both successful and unsuccessful), any privilege change requests (both successful and unsuccessful), user actions affecting security (such as password changes), attempts to perform actions not authorized by the authorization controls, all configuration changes etc. Additionally, the access to such logs must be controlled in accordance to the least-privilege concept, so that entries may not be deleted, accidentally or maliciously.
	Proposed solution should support integration with industry standard SIEM solution.
4	**Cyber Vulnerability Assessment**
	Proposed solution shall have only ports and services required for operations are enabled.
	Solution Provider to share hardening document of the proposed solution.
	Solution Provider to submit 3rd Party Vulnerability Assessment & Penetration Testing Report from a CERT-In empanelled auditor along with steps taken to mitigate the findings.
	The solution will be put in production on successful closure of VAPT observations identified during deployment/UAT phase. Also, while in operation, the solution is subject to VAPT assessments at predefined frequency. The solution provider should close all identified vulnerabilities within agreed time period without any cost to Tata Power
5	**Security Patch Management**
	Solution Provider shall ensure implementation of security patches, cumulative service packs, releases, and version upgrades of applications.
	Solution Provider shall prepare a checklist for ensuring security hardening after patch has been installed
6	**Disposal**

	Solution Provider to work with TPCODL to destroy or erase the data storage media to prevent unauthorized retrieval of sensitive cyber security or reliability data
7	**Cyber Security Incident Documentation**
	Solution Provider to work with TPCODL team for any investigation and documentation related to cyber security incidents, if any.
8	**Contingency Plans**
	The back-up architecture using USB devices shall be prohibited.
	The solution should be deployed in High availability mode
9	**General Security**
	Implementation of anti-virus software and other malicious software prevention tools shall be supported.
	The proposed system shall also allow host-based firewalls to be configured, as an additional layer of security if the network firewall were to fail.
	The proposed architecture must be secure with support for encryption of data at rest and during transit. Solution provider to provide details of methods used to safeguard data at rest and during transit. The solution should support minimum security protocol TLS 1.2. Lower versions must be disabled.
	The remote access to support engineer, if any, should be provided through secured channel having logging and monitoring mechanism through text/video logs
	The solution provider should have a local TAC support team with 24x7 coverage for any security issue
	The solution should support browsers - Edge, Chrome, etc. with latest version without additional requirement of any special plugins, browser cookies, or Java
	The solution provider should share complete mapping of proposed solution stack with broad components in RFP
	The source code of customized part of the application software will remain as exclusive property of Purchaser, even after the termination or expiry of the contract. The solution provider should arrange ESCRO mechanism for the same.
10	**Network Architecture**
	Solution Provider to share the updated architecture for proposed solution and review it at-least once a year.

5 Integration:

5.1 MDM Integration:

HES shall preferably interface with MDM on standard interfaces and the data exchange models and interfaces shall comply with CIM / XML / IEC 61968 or any other open standard. The solution shall be Service Oriented Architecture (SOA) enabled. The HES shall support web based multiple data base support software and also support standard integration for third party MDMS. Bidder is expected to integrate with the MDMS for the following use cases and not limited to:

- Meter Add / delete / Update
- Meter status fetch
- Meter Data
    - Billing Data

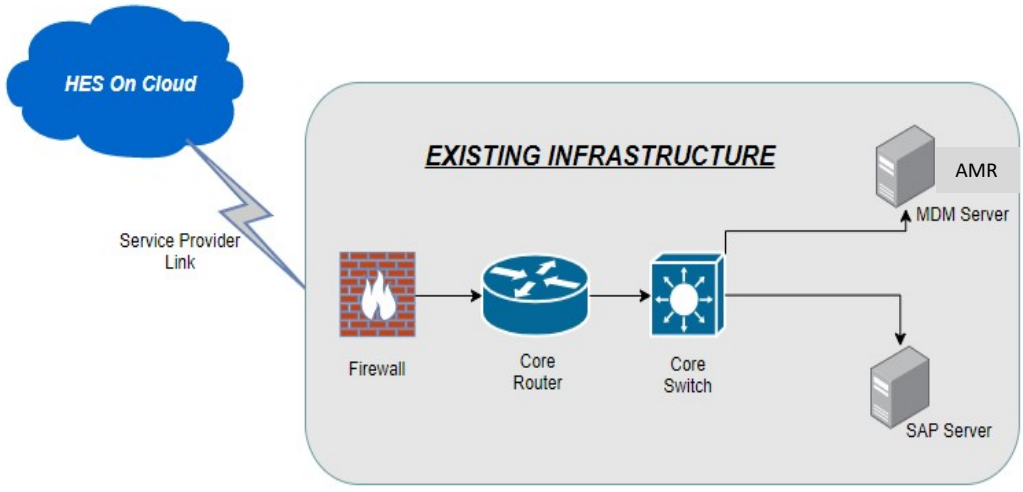
  - Interval Data
  - Daily Profile
  - Meter Events
  - Instantaneous Data
- Meter Ping
- Meter – On Demand Read
- Meter Power Status Verification
- Meter Connect and Disconnect
- Meter Messaging
- Update Meter Firmware
- Update Meter configuration

- All interfaces with other IT-OT system should support below standard interface protocols:
  - CIM 2.0
  - SOA Based architecture
  - XML based Integration
  - Flat File based Integration
- Writing to meter display meters should be enabled from MDM (TPCODL will provide utility specific OBIS codes where ever OBIS codes are not defined in IS)
- Pull of meters interval / billing profile / daily profile / events from MDM (Channel wise pull should be available with variable input dates)
- Single window to view all meter commands executed from MDM
- Demand Reset from MDM
- Push Demand and TOU values from Meter on daily data
- Scheduled push of Instantaneous data
- Provision to export Event Parameters (Snap shot of all electrical parameters at the time of event occurrence)
- Export all Critical events to MDM Real time

6 General IT Infra & Cloud Service provider guidelines

6.1 Proposed Architecture

The proposed solution should be On-Cloud with proposed architecture as below:



The configuration –communication modules as well as application, database, communication servers – shall support the following environments:

- Development environment
- Testing Environment
- Production environment
- Disaster Recovery (DR) environment (Only for Production system with similar capacity)
- RPO and RTO of the DR system should not be more than 30 minutes for any system.
- Within the completion of project i.e user acceptance, the final bidder will conduct one DR drill in which complete solution should work from back up data center with least impact to users.
- The proposed solution sizing must be based on Application High Availability and DR Replication to meet above mentioned RTO / RPO.
- The proposed solution should provide security through Non-repudiation, authentication, integrity and confidentiality.
- The proposed solution should provide advanced end to end Security features with strong mechanisms to prevent systemic attacks on the system.

6.2 Cloud Service Provider (CSP) Requirement

- The datacenter of CSP must be within India only.
- All the physical servers, storage and other IT hardware from where cloud resources are provisioned for this project must be within Indian datacenters only.
- The datacenters of CSP should be spread across different geolocation in different seismic zones.
- The CSP datacenters should have adequate physical security in place.
- The CSP datacenters should comply/certified Tier III datacenter norms.
- The Data Centre should conform to at least Tier III standard (preferably certified under TIA 942 or Uptime Institute
- CSP should clearly define policies to handle data in transit and at rest.
- CSP should not delete any data at the end of agreement without consent from TPCODL.
- In case of scalability like horizontal scalability, the CSP should ensure that additional generated data is modify/deleted with proper consent from
- CSP cloud platform should be protected by fully managed Intrusion detection system using signature, protocol, and anomaly based inspection thus providing network intrusion detection monitoring.
- CSP should deploy public facing services in a zone (DMZ) different from application services. The Database nodes (RDBMS) should be in a separate zone with higher security layer.
- CSP should give ability to create non-production environments and segregate (in a different VLAN) non-production environments from the production environment such that the users of the environments are in separate networks.
- CSP should provide access of cloud virtual machines either by SSH in case of Linux and RDP in case of Windows servers.
- CSP should enable TPCODL to get console access of cloud virtual machine from portal and perform operations

- TPCODL CSP should upgrade its hardware time to time to recent configuration to delivery expected performance for this Project.
- CSP must ensure that the virtual machine format is compatible with other cloud provider.
- CSP should give provision to import cloud VM template from other cloud providers.
- CSP should ensure connectivity to and from cloud resources used for this project is allowed to/ from other cloud service providers if require.
- CSP must ensure that cloud virtual machine of project is into separate network tenant and virtual LAN.
- CSP must ensure that cloud virtual machines are having private IP network assigned to cloud VM.
- CSP must ensure that all the cloud VMs are in same network segment (VLAN) even if they are spread across multi datacenters of CSP.
- CSP should ensure that cloud VMs are having Internet and Service Network (internal) vNIC cards.
- CSP should ensure that Internet vNIC card is having minimum 1 Gbps network connectivity and service NIC card is on 10 Gbps for better internal communication.
- Must ensure that public IP address of cloud VMs remains same even if cloud VM gets migrated to another data center due to any incident.

- CSP must ensure that the public network provisioned for cloud VMs is redundant at every point.
- CSP must ensure that cloud VMs are accessible from TPCODL private network .
- CSP should ensure that cloud VM network is IPV6 compatible.
- CSP should have provision of dedicated virtual links for data replication between their multiple datacenter in order to provide secure data replication for DR services.
- CSP should ensure use of appropriate load balancers for network request distribution across multiple cloud VMs.
- CSP needs to share proposed architecture along with bid document.
- CSP should provide scalable, dynamic and redundant storage.
- CSP to submit DC-DR replication and failover policy/procedure .
- The CSP should offer dashboard to monitor RPO and RTO of each application and database.
- CSP must provide backup of cloud resources. CSP to adhere TPCODL back up and restore policy

7 RISK Mitigation:

HES implementation partner is expected to work with TPCODL Project Manager to Plan and Monitor Risk. They shall regularly update to Concern project manager and update the strategic resolution of Risk for both stated and unstated risk

Some key Risk which HES provider shall consider:

- Non billing of consumers due to fall in communication rate
- Delay in integration of HES, MDMS, Mobile App etc.
- Lack of data acquisition or inability to acquire data from meter and data transfer to HES
- Issue due to non-interoperability of each system.
- Managing data from different metering protocol and meter security keys
- Requirement of API if in case required.

8 Mandatory requirements before Rollout

1. **The bidder shall also clearly spell out all possible equipment, service, software needed to run** the system technically from their end, pre, during & post installation work.

2. The bidder shall confirm that, the HES has sufficient logic driven smoothening built in features, for example: reliably determining current status of a meter once an outage alert is received from the meter, as well as, ability to suppress or filter false positives from outage and restoration notifications. There should be provision for deploying more such user defined logics.

3. As the proposed system will be integrated with different IT-OT system of TPCODL (SCADA, Solar, SAP, OMS, and GIS etc.); to ensure interoperability with these systems, any upgrade required in the hardware/software (including 3rd party items) of proposed solution shall be the responsibility of bidder during the entire warranty and post warranty FMS period.

4. The bidder shall outline the software (OS & others including licences, if any) & hardware requirement for running the system, including the HES for 15 years with necessary Disaster Recovery (DR) features & security aspects in place and also shall guarantee performance of the entire system in quantifiable terms, for all conceivable parameters

5. Specifications of hardware shall be provided along with bid and Manufactures authorization for warranty & guarantee shall be in Name of TPCODL.

9 Project Management:

9.1 Project Organization

The primary points of contact between TPCODL and the Supplier shall be their respective project managers.

9.1.1 TPCODL's Project Manager

TPCODL’s project manager shall be responsible for representing TPCODL’s interests throughout the project. TPCODL’s project manager will, from time to time, authorize other staff to act in this regard for specific tasks. The project manager will also change such assignments from time to time. Such actions shall be submitted to the Supplier in writing.

All correspondence with TPCODL shall be addressed to TPCODL's project manager.

9.1.2 The Supplier's Project Manager and Project Personnel

The Supplier shall designate a project manager who shall be responsible for the co-ordination of all project work and for the communications between the Supplier and TPCODL. Except for conditions outside the control of the Supplier, the Supplier's project manager shall not be removed or replaced without the approval of TPCODL.

The project shall be staffed with a core project team. Additional personnel shall be assigned to work under the direction of the core team as required to effectively implement the proposed system. Core project team members shall have previous experience in a similar position on at least one other project that is similar in size and scope to this project.

The Supplier shall inform TPCODL of any pending or possible changes in the use or status of all Supplier project personnel. Any changes to Supplier staff, including work assignments and participation level, shall be announced as soon as practical and shall be subject to TPCODL's approval. TPCODL shall have the right to have any Supplier staff removed from the project for cause.

9.1.3 Project Documents

Project documents shall specifically include the following and shall be delivered to TPCODL by the dates indicated in the reference section (where the content of the document is also further defined):

- Documentation Plan
- Project meetings, Agendas and Minutes
- Project Correspondence
- Detailed Implementation Schedule
- Test documents
- Training documents

9.1.4 Documentation Plan

A documentation plan shall be submitted to TPCODL twenty working days after contract award. The documentation plan shall describe, in detail, the Supplier's plan for the submittal of all subsequent documentation. It is expected that certain major documents, such as the detailed hardware and software design documentation, will consist of a series of submittals made over a period of time. The documentation plan shall address this by including a detailed list of all individual documentation submittals for the project.

This list shall include, but shall not be limited to, the following information for each document:

1) Document name
2) Document number based on TPCODL's File Plan
3) Document type (such as, functional design, detailed design, listing, or user guide)
4) Estimated and actual date of submittal
5) Document status (such as, submitted for review, submitted for approval, returned for correction, or approved.).

The plan shall serve as a checklist throughout the project and shall be revised and resubmitted by the Supplier as necessary.

Documents shall be submitted in a sequence that allows TPCODL to have all of the information necessary for reviewing or approving a particular document at the time of its submittal. Documentation shall be submitted in a manner that allows for a reasonably paced review effort. The documentation plan shall be subject to TPCODL approval.

9.1.5 Project Progress Reports

A project progress report shall be prepared by the Supplier and sent to TPCODL every two weeks throughout the warranty period. The report shall be submitted to TPCODL's project manager no

later than the 10th calendar day of each month. The report shall cover the project from the start of the contract through the last working day of the month.

The progress report shall include a general assessment of the progress on the project. This assessment shall reference the latest implementation schedule, which shall be included in the report. The schedule shall show the baseline and the current schedule, progress on individual tasks, and the forecasted completion dates for upcoming tasks and the entire project. Updated training and documentation plans shall be included.

The report shall include an explanation of existing and forecast schedule variances, the cause or source of the variance, alternatives considered, solutions adopted or recommended, and the outcome achieved or anticipated. In particular, the report shall note the needed delivery date of TPCODL-furnished information. The Supplier shall be responsible for any schedule delays due to insufficient notification to TPCODL of the need for such information.

The report shall identify unresolved contract issues. This shall include a description of the item and the current due date, the consequences of any delay in resolution, and any recommendations pertinent to the decision process.

The report shall also include the following items:

1) A list of action items, including the following information:
    a) The action item number
    b) The date the item was opened
    c) References to the originating transmittal and any reference documents
    d) Action item status (open, closed)
    e) Resolution due date
    f) The responsible organization or person
    g) A description of the action required
    h) The date of action completion (when each item is closed)
    i) References to transmittals or other documents recording the resolution.
2) Correspondence logs, one for transmittals to TPCODL from the Supplier and one for transmittals to the Supplier from TPCODL. Each log shall have the following information for each transmittal:
    a) The transmittal number
    b) The date of transmission (not the date written)
    c) The date received
    d) The subject of the transmittal
    e) Identification of any action items addressed by the transmittal
    f) A list of any documents attached to the transmittal.
3) Training Status

9.1.6 Project Meetings, Agendas, and Minutes

Project meetings shall be held to review project progress, to ensure correct interpretation of the contract, to review technical and commercial issues, and to maintain co-ordination between TPCODL and Supplier. Meetings shall be scheduled at appropriate times, but shall be scheduled

every month on average. The Supplier's project manager shall prepare a meeting agenda in time for review by TPCODL before the meeting.

The Supplier shall prepare minutes of each meeting. Both TPCODL and the Supplier shall review and approve the minutes. The approved minutes shall be considered binding agreements, subject to concordance with the contract. Where the approved minutes conflict with the contract, either the minutes shall be revised or a change order to the contract shall be generated. Where the minutes of a meeting conflict with the approved minutes of a previous meeting, the conflict shall be documented in the later minutes and those approved minutes shall have precedence.

9.1.7 Project Correspondence

All requests and transfers of information between the parties shall be made in writing, and shall be documented with letters of transmittal. All correspondence from each party shall be dated (with the date of transmittal, not the date of writing) and uniquely numbered. With the exception of the meeting minutes, each letter or other project correspondence shall be limited to a single topic to simplify correspondence management. Correspondence transmitted via facsimile shall be considered as binding if a printed copy of the correspondence is delivered within four weeks of the facsimile transmission.

Correspondence may be exchanged by electronic mail. Such correspondence shall not be considered a substitute for formal correspondence, however. Agreements established through e-mail transmittals must be recorded as formal correspondence before they become binding. A printed copy of e-mail attached to a transmittal cover sheet shall be considered a formal transmittal.

All project management documentation, such as, correspondence, memos, meeting minutes, and monthly progress reports, shall be produced using the Microsoft Office productivity suite. A mutually agreeable file numbering scheme shall be developed and used to minimize file storage and retrieval efforts.

9.1.8 Detailed Implementation Schedule

The Bidder shall submit for TPCODL's approval a detailed implementation schedule. This shall describe all the project activities of both the Bidder and TPCODL. As a minimum, this schedule shall include the following:

a) Preparation of test plans and procedures
b) Site tests
c) Variance correction and retest
d) Delivery of complete system including hardware and software
e) New system installation
f) Subsystem integration and testing
g) Interface testing
h) Final system and user documentation
i) Training

The Bidder shall use a commercially available project management application (for example, Microsoft Project) to maintain the project schedule. This project management application shall be used to track the progress of the project from start through completion. Schedule monitoring shall be based on a comparison of completed tasks versus scheduled tasks and estimation of the required effort to complete the remaining tasks.

10 Quality Assurance (QA), Factory Acceptance Test (FAT) and Site Acceptance Test (SAT)

To ensure that the Bidder produces a well-engineered and contractually compliant equipment, a quality assurance program shall be followed

The bidder must employ documented Quality Assurance (QA) techniques and practices throughout this project. The bidder should prepare implementation methodology covering:

a) Schedule of Factory Acceptance Test, supply, installation, SAT (Site Acceptance Test), Trial runs, commissioning etc.

b) Allocation of manpower for different activities

c) Submission of Quality Assurance (QA) techniques indicating completion of various activities within targeted time frame.

This QA program shall be adhered to the preparation of all Contract deliverables, including documentation, hardware, firmware and software. The program shall aim at minimization of defects, early detection of actual or potential deficiencies, timely and effective corrective action, and a method to track all such deficiencies etc.

TPCODL shall be allowed access to the Bidder's facilities during system design and testing and to any facility where hardware or software is being produced. The Bidder shall provide office and testing facilities, equipment, and documentation necessary to complete all inspections.

TPCODL shall be allowed to inspect the Bidder's hardware and software quality assurance standards, procedures, and records. Documents identified in the approved software quality assurance plan will be inspected to verify that the Bidder has performed the required quality assurance activities.

11 Service Level Agreement:

These performance levels shall apply to the complete AMI system.

AMI system includes the communications links provided by Network Provider /third parties such as telecommunications companies and HES bidder has to ensure the desired performance level.
The performance levels exclude force majeure events.

Bidder shall ensure achieving the following Service Levels during the Facility Management Services phase:

S.no	Type of Functionality / Data	Measurement Unit	Quantity
1	Billing Profile, as measured at HES Output (Monthly Push)	% of total meter installed	99
2	Daily Profile (Daily Push) (Mid Night Billing registers), as measured at HES output.	% of total meter installed	99
3	Load Profile (Push mode), as measured at	% of total meter	95

	HES output.	installed having 100% interval data for the month	
4	Meter Events (Push mode)	Hrs	100% within 24 hrs
5	**AMI Network (all hardware, software, smart meters, Cloud Infrastructure and field equipment) Uptime**	%	99
6	**Cloud Infrastructure uptime**	%	99

S. No	Parameter	Meter to HES	Remarks	HES to MDM
1	Billing Profile (Monthly Push)	Once in a month and as when the meter is reset	Latest by 5th of the Calendar month, or within 2 days of Meter reset	Every 30 min
2	Daily Profile (Daily Push)	Once in a day (00:00 hrs read)		Every 30 min
3	Load Profile (Push mode)	Every 4 hours		Every 6 hrs
4	Meter Events (Push mode)	As and When Event Occurs / Restores		Real time (as soon as event received in HES)
5	On Demand - Meter Reads	As and when Meter is Pinged		Real time (Immediately when the data is received in HES)
6	ON Demand - Billing Profile	As and when Meter is Pinged		Real time (Immediately when the data is received in HES)
7	ON Demand - Daily Profile	As and when Meter is Pinged		Real time (Immediately when the data is received in HES)
8	ON Demand - Load Profile	As and when Meter is Pinged		Real time (Immediately when the data is received in HES)
9	ON Demand - Event Data	As and when Meter is Pinged		Real time (Immediately when the data is received in HES)

Penalty:

Availability of HES + Communication System per Month	% Deduction

> 99%	NIL
Less than 99%	Penalty will be 1% of the FMS Charges per month for every 1% or part there of decrease in availability under 99%).
Scheduled daily meter readings (as per IS 16444/15959, IS15959 Part 2 & 3) 95% meters within 8 hours of midnight 99.5% within 24 hrs	
Penalty will be 1% of the FMS Charges per month for every 1% or part there of decrease in availability under 99%).	

- **Bidder to share responsibility matrix along with bid document.**
- **Maximum value of monthly penalty shall be limited to 10% of monthly FMS charges**

12 Facility Management Services (FMS):

The scope of work under Facility Management Services shall include a comprehensive maintenance of all the software (including licensing, SIM Card, annual technical support) and hardware, if any, along with field devices provided by the bidder under this project. During the entire contract period, contractor shall make available resident hardware & software specialists, who shall be available upon requirement. Bidder shall replace or repair all defective parts, if applicable and shall have prime responsibility for keeping the system operational. Period of FMS support shall be Seven (7) years from Operational Acceptance.

System availability requirements during the FMS period shall be as per the SLA.

Bidder shall be responsible for coordination with the OEM/Telecom service providers for all matter related to project and shall be responsible for meeting the overall response times and availability requirements specified.
The FMS of the System shall be comprehensive and shall comprise of the following category:

a. Preventive Maintenance Activity (performance monitoring, system backup, hardware & software maintenance and update, field & network devices firmware update, emergency response and troubleshooting etc.)

b. Integration of new devices (Meters/nodes, networking devices, NIC, integration with existing system etc.)
c. Maintaining adequate spares for FMS.
d. Monitoring:
Bidder shall conduct following monitoring at TPCODL control center and undertake corrective maintenance for the same for any anomaly detected.

- System logs for a selected day
- Aggregate data collection

- Field & Network Device failure
- Events collection
- Availability of communication link
- CPU loading (Peak and Average)
- Memory utilization (Peak and Average)
- Disk utilization (Peak and Average)
- Operating system resource utilization reports
- System error log

e. Bidder shall be responsible for providing updates/patches for the software products supplied under the project and shall provide mechanism for patch management.

Reporting:

Bidder shall submit an appropriate defect reporting procedure to meet the requirement of all severity level categorized below:

Category	Definition
Severity 1 – Urgent	Complete system failure, severe system instability, loss or failure of any major subsystem or system component such as to cause a significant adverse impact to system availability, performance, or operational capability like : a. Loss of data due to any problem in software /hardware. b. Loss of data due to any problem in communication network c. Outages of any application software. d. Cyber Security issues. e. >1000 meters non communicating
Severity 2 – Serious	Degradation of services or critical functions such as to negatively impact system operation. Failure of any redundant system component such that the normal redundancy is lost a. Failure of Storage System, stoppage of data collections for archiving and outage of other applications not covered under severity-1 are included in this category. b. > 500 <1000 meters non communicating c. Failure of any redundant system component affecting the critical redundancy like loss of any one Application Processor, Router
Severity 3 – Minor	Any other system defect, failure, or unexpected operation (as described at 11.9.3-Serverity-3)
Severity 4 – General/Technical Help	Request for information, technical configuration assistance, “how to” guidance, and enhancement requests. (As described at 11.9.4-Severity-4)

Response Time:

Severity	Response Time	Resolution Time	Action
1	15 minutes	2 hours	An urgent or emergency situation requiring continuous attention from necessary support staff until system operation is restored – may be by workaround.
2	1 Hours	12 Hours	Attempt to find a solution
			acceptable to TPCODL
3	8 Hrs	1 days	Evaluation and action plan.
4	1 day	2 days	Report on the problem/query is to be furnished.

Documentation:

a. System description documents (Overview)
b. Data requirement sheets for all items
c. Functional description document
d. Database documents
e. Drawings of system
f. Software description/design documents for each module
g. Factory test procedure and report
h. System configuration parameter
i. Training documents
j. System administrator documents
k. User guide
l. Software licenses
m. Type test reports
n. Schematic drawing
o. Complete description of the operation, data and logic interfaces with other functions.
p. User Documentation
q. Network communications management
r. Processor configuration
s. System performance monitoring
t. System restart/failover management and diagnostic procedures
u. Software utilities
v. Software maintenance
w. Application software parameters and tuning guides
x. Web administration
y. Other bidder supplied system software not included above.
z. Documentation for all factory, field and availability tests shall be provided

13 Technical Scoring Criteria:

Sr. No.	Technical Qualification Criteria	Max Score
Technical Solution Score		**50**
1	Project Experience	**30**
a	Number of cloud based HES project successfully completed in last 3 years	10
	No of Projects Completed: 3 Projects 4 Projects > 5 Projects	 5 7 10
b	Project Exposure	7
	(i) Projects Implemented in India – 5 marks (ii) Projects Implemented in India & outside India – 7 marks	
b1	**Gartner Magic Quarter**	**3**
	(i) Presence in Gartner Magic Quadrant – 1 marks (ii) Presence in Gartner Magic Quadrant Leader – 3 marks	
c	Experience in Integration of HES with MDMS	10
2	CVs of minimum 5 individuals including Project Manager with relevant experience of minimum 5 years (purchaser may take interview of employees whose CV has been submitted and no resource diversion will be allowed unless it is produced that employee has resigned from Organization. As the project duration is one year)	**5**
3	**Pre-Demo** The Bidder will set up all required equipment at TPCODL site. The Bidder is expected to demonstrate all standard software necessary for implementation of HES system by simulation of HES under various scenarios. The Bidder is required to set-up their own system/server for demonstration purpose. The application functionalities demonstrated are to be with data relevant to the business of TPCODL All queries are to be addressed during the demonstration only, and no further opportunities would be presented for subsequent clarifications, if any. Kindly note that the bidders are expected to bring necessary software / hardware required to support such demonstrations. Adherence to the timings is critical and the overall demonstration should not exceed specified hours. **TPPDL shall provide the existing data for HES simulation to bidders at the time of bid thereafter within one month pre-demo should be done**	**10**
4	**Design proposed.**	5

	Additional points will be given to the bidder who will propose leanest design of Hardware – 5 marks Next bidder to the leanest will be awarded – 3 mark No marks will be awarded to any other bidder.	

Minimum Score required for Technical Qualification- 35 Marks

SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF METER DATA MANAGEMENT SYSTEM (MDMS)

(Scope of Work & Technical Specifications)

For reference purpose only- Not in the scope of bidder

Contents

1. Scope of Work

Scope of this RFP is to procure a solution to manage the Meter Data which can support following functions:

- To provide a single meter data repository for different nodes of Network in addition to Consumer Revenue Meter.
- Meter reading processing and developing billing determinant for Domestic, Industrial, Commercial, agricultural, Net Metering, Open access customers etc. as per TPCODL billing requirement.
- Integration with Current SAP Landscape and its existing business processes
- Integration with SAP platforms to offer smart metering processes and automation
- Virtual Metering for Customer Service, BI, Energy Audit and Network planning purpose.
- On demand / scheduled read request processing.
- Device Management (Detection, Provisioning and Commissioning of Device).
- VEE (Validation, Estimation and Editing)
- Revenue protection module (Integrating with Modules in SAP ISU)
- Event Analyzer / Reporting.
- Analytical module to handle logics for handling data from different sources to device business logics.
- Outage Event Managers
- Device Control (Remote Connect / Disconnect)
- Pre-payment Module / Support (Integrating with SAP Modules)
- Demand Response Management
- Integration with existing AMR system (Analogic & Genus)
- Integration with SCADA-DMS
- Integration with Network Planning Software (Like Cymedist, ETAP etc).
- Integration with GIS (ESRI)
- Integration with load forecasting tool.
- Integration with SAP-CRM/Call Centre Application
- Integration with TPCODL Mobile App & Web-application.
- Complete source code of MDMS should be handed over to TPCODL along with training of TPCODL staff for same.
- Virtual Metering – Use case:
  a. Handle Input meter data (ABT meters)
  b. Calculating co-incident demands with time stamping.
  c. Processing of Bulk supply bill (15 min interval input data)
  d. Reliability Index calculation
- Universal Calculation Engine with Mathematical, Logical and Statical Operators
- Integration for Real time BI system & Standard ETL Process / Tools

- All parameters as per Meter Specifications should be catered to by MDMS.

This RFP will include supply of all above mentioned modules along with technical specification of required hardware capable to run the supplied software for 3 lakh endpoints with a data storage of 5 years for maximum of 16 channels 15 minutes of interval data along with all other type of meter data.

This RFP also include installation, commission and testing of the MDMS along with integration of MDMS with other application of TPCODL as asked for in this RFP. **Bidder to complete installation and integration of MDMS within one year from date of Purchase Order.** Bidder has to provide perpetual license along with warranty from the date of project acceptance to Ten years after Go-Live. Bidder should also provide all the updates free of cost during warranty and FMS period. Bidder should also provide the required training to the users for operating, developing system and administrative training to selective persons for running system after support period free of cost.

Bidder has to provide all the supporting 3rd party software which it recommends for operation of the system free of cost till the end of FMS period.

- The bidder shall provide 6 years onsite warranty after user acceptance of all supplied, installed, configured and commissioned system. Any software updates, upgrades, patches released till the completion of warranty period shall be supplied, installed and commissioned under scope of agreement / PO / RC. Training to TPCODL employees on new version of software from the OEM or OEM's certified training partner shall be arranged by the bidder. Bidder shall maintain the software on 24X7 basis during Warranty period as per agreed SLA.
- The Software licenses will be in the name of TP Centrl Odisha Limited and will be perpetual in nature.

System will operate in English (British / US) language.

System should have a reporting system in GUI form which can plot any report using different parameters of meter for user analysis purpose.

1.1 Key Requirement

1.1.1. AMI Program Objectives

In addition to meeting the TPCODL objectives with respect to loss reduction, energy efficiency and conservation, the AMI Program is one of TPCODL's key strategic initiatives, which is to: “Enable customers to actively manage their energy choices, adopt new energy and conservation solutions and benefit from an electric utility that is modern, reliable, safe and cost- effective.”

AMI's key strategic objectives include:

a) **Achieve Operational Efficiencies**: improved reliability and lower operating costs in areas such as meter reading, distribution system maintenance, and outage management.
b) **Protect Revenue**: reduced revenue loss due to the theft of power directly from the distribution grid and tampering with the meters, as well as revenue "leakage" in some customer processes.
c) **Keep Customer Bills Low:** achieving the conservation benefits, operational efficiencies, and revenue protection lead to utility rate reductions which translate directly into customer savings.
d) **Improve Customer Service**: provide real-time and detailed information on consumption and cost, and enable better customer communication around outages.
e) **Achieve Conservation and Energy Efficiency:** energy and capacity savings achieved through time- based rates, effective communication and incentives to customers, customer direct control of energy use, and system operational improvements.
f) **Achieve Environment and Social Benefits:** facilitating customer conservation, energy efficiency, reduced greenhouse gas emissions, and improve safety for employees and the public.
g) **Support Advanced Customer Applications:** provide a substantial portion of the foundational infrastructure required to modernize the utility in support of advanced customer applications such as prosumers, electric vehicles, demand response, micro-grids, and future applications. Smart Meter Interface is a key, but not sole, enabler of these advanced applications.

1.1.2 MDMS Functional Requirements:

1. The MDMS system shall support multiple Head-end-System (HES)-AMR / AMI System integration.
2. MDMS should integrate with the existing SAP based business processes and modules within the TPCODL scenario.
3. MDMS features and functionalities shall comply to IEC-61968-9, latest edition, for interfacing with other upstream and downstream systems a framework to achieve interoperability between those systems. It will be responsibility of the bidder to integrate MDMS with other systems deployed in TPCODL as specified in this document.
4. The MDMS shall have passed EPRI IEC 61968-9 interoperability tests.
5. The MDMS shall provide storage for all IEC CIM 61968-9 units of measure.
6. The MDMS shall identify irregular alerts, consumption, alarms, and other abnormal activity and should proactively generate the necessary reports, service orders, or any user defined actions, resulting in operational efficiencies.
7. The MDMS shall perform complex interval data calculations supporting: addition, subtraction, negative values and multiplication by a different constant based on magnitude.
8. The MDMS shall have the ability to automatically route validation errors to different electronic work queues based on at least the following data elements: Validation Error, Account Type, Meter Type, or any combination of the above listed.
9. The MDMS shall have the ability to select which validations apply to accounts based on the following at a minimum: rate category, billing class, customer category, meter type, walking sequence, variable or zero use code, Contract Account, Installation, and Meter ID & Manufacturer.

10. The MDMS shall have the ability to apply different estimation algorithm based on different missing data conditions (e.g. missing interval in a one hour gap, missing interval with known scalar reads, missing intervals of an entire billing span, etc.).
11. The MDMS shall re-estimate the Gaps readings if, intermediate any actual reading made available by HES, when it is made available and without waiting until the billing cycle is due.
12. The MDMS shall suspend processing of the current read and flag any cut off meter data when it encounters some configurable criteria which cause a validation failure.
13. The MDMS shall revalidate any data if user edits or manually estimates. Should be able to have provision for holding premise type, type of work, Latitude and Longitude in addition to other master data.
14. The MDMS shall detect multiple flags during any technical validation performed during meter data import including Meter hardware/firmware failures, Communication errors, - Mismatches between the meter configuration and the MDMS meter reference data (e.g., meter program, unit of measure, multiplier or load factor, etc.), Meter replacement, Gaps in data, Alarms/ phase errors reported by the meter (e.g. tamper, outage, phase failure, pulse overflow, CRC error, time tolerance, and theft flags/tampers).
15. The MDMS shall detect the following during business validation for scalar / time of use / interval data performed during meter data import for Meter rollovers, High / low consumption limits, Negative consumption, High / low checks against a customer profile, Usage on an inactive meter etc. The MDMS shall have the ability to merge and split intervals from different meters or channels into the same account and automatically combine different cuts of data. (Use case Interval Data and RTP) TPCODL would configure the legacy rules based on their business requirement.
16. The MDMS shall account for information derived from AMI alerts and alarms and from external systems (e.g., outage management systems, etc.) when performing VEE.
17. The MDMS shall have the ability to perform VEE functions on-request in addition to scheduled VEE process.
18. The MDMS shall support version tracking of meter read data including the reading source in the event that multiple iterations of the interval values are available as a result of VEE contingency reads, on-request reads, or any other event that may create additional versions of meter read data.
19. The MDMS shall have the ability to respond to the billing request with estimated readings within one business day of receiving a billing request from CSS if actual readings cannot be obtained and are not received.
20. The MDMS shall have the ability to process the meter register read data / Interval data for calculating the billing determinant within one hour of receiving the data from HES. Same should be uploaded in SAP with in this one hour.
21. We will create Reading Quality Checks which system should follow while uploading reading in SAP and should generate exception log reports which authorized user can check and process on case to case and bulk basis.
22. MDMS should have capability to retain data of at least 3 lakh endpoints for last 5 years (All type meter data).
23. The MDMS shall have the ability to compare summarized interval reads with scalar reads and when estimating, ensure estimates are balanced to the scalar read.

24. The MDMS shall have the ability for any given meter, to select different versions of reads based on priority of the reading source, and if necessary, combine sources, to satisfy a billing request for reads.
25. The MDMS shall support the integration of prepayment systems if supplied by third party.
    Provision of additional VEE logic insertion along with existing ones and modification in existing logics.
26. Instantaneous data should flow from HES to MDM also and provision for ODR scheduling of instant data.
27. The MDMS shall provide a mechanism to receive disconnect and reconnect commands and transmit them down to the appropriate Head End Systems for activation and should receive the feedback and update in SAP for same.
28. Disconnected meter's reading should be continued till the meter is de-commissioned and if any reading increment is noticed, an alert should be generated.
29. The MDMS shall provide a daily summary report of validation errors that occur as part of VEE (VEE Summary Report). The VEE Summary Report shall include the following information at a minimum: Date of Report, Number of Meters that Failed Validation, Number of Validation Errors Sent to the Electronic Work Queue, and Number of Validation Errors Broken Down by Validation Error Type (e.g. high/low check).
30. The MDMS shall generate a report listing meters that were estimated and the reason for estimation. (Completed VEE) and for which the system could not create billing determinants in a configurable period of time. (Failed VEE)
31. The MDMS shall provide an estimation report by meter which provides details of all estimations, flags them, as well as identifies gaps where automatic estimation could not occur.
32. The MDMS shall have configurable capability to prioritize readings that have been manually captured and imported over readings captured remotely and version them as such for the same request for a given billing period.
33. The MDMS shall have the ability to request specific, current or historical data from the meter.
34. Provision of importing data of meters without linking with Connection Account on authorization basis. (Use case : Analysis of data of meters which are procured and are under testing.)
35. The MDMS shall have the ability to define groups of meters that will apply unit modifications,
    e.g. if a meter is read in MWh/MVARh/MVAh and SAP requires kWh/kVARh/KVAh, to allow SAP to process the data, and facilitate the translation.
34. The MDMS should enable users to define “best read” logic for using multiple and overlapping readings within the same request window. If valid readings cannot be obtained within the reading window, the MDMS can derive an acceptable reading or initiate a new read request using a variety of standard / configurable / newly created business rules.
35. Outage messages passed on by MDMS should minimize the outage traffic to upstream Outage Management System (OMS). The MDMS should study the published affected customers / other units then should transfer the additional outage list to OMS. At the same time if it has a new “first breath” response from the field, later than that of OMS list, should also publish to OSM as restored ones.
36. MDMS can be configured to calculate an estimated read, include an invalid

reading flagged with an invalid indicator, or invoke an automated gap fill process to re-request readings from the appropriate collection engine.

37. The MDMS shall associate billing calculations with specific versions of data. It shall also be able to support the versioning and restoration of billing determinants and algorithms to support audits.
38. The MDMS shall be able to calculate estimated billing based on interval data for dynamic rate structures such as but not limited to Time of Use, Real Time Pricing, Peak Time Rebate, and Critical Peak Pricing.
39. MDMS should have the capability to create coincident peak from Interval data for all the measured and subsequently virtual meters as per requirement.
40. The MDMS shall have the ability to perform VEE functions as part of the bill determinant generation process on a meter or multiple meters, possibly across multiple service points containing more than one meter, for which there may be multiple reading types (i.e. interval, time of use, scalar, etc.)
41. There shall be an indicator / flag marking the version (actual / estimated) of data that was used for billing.
42. The MDMS shall send billing determinants for all end point meters regardless of whether or not a customer is active. (A report of exception should be populated)
43. The MDMS shall have the ability to notify users that no actual or missing billing determinants exists if the requested date range for a rebill includes any day with no actual data.
44. The MDMS shall create work items if data is unable to be estimated during the process of generation of bill determinant. The system should check for existing work items and update if available.
45. The MDMS shall update billed versions based on rebill notification (e.g. previous date range version now is "cancelled" and new date range is billed version.)
46. The MDMS application shall supported an Oracle Database.
47. The MDMS shall run on an enterprise Red Hat Linux operating system of enterprise version
48. The MDMS shall be capable of running under a virtualized environment
49. The vendor shall accommodate the changes recommended by third party security penetration testing performed on the MDMS party just after go live
50. The MDMS shall align to Indian Guidelines for Smart Grid Cyber Security
51. The MDMS shall support end-Users and Administrator security, including:
    - Individual, named accounts for each end-user and administrator
    - Role-based security
    - Administration privileges provided only through specific authorization
    - Configurable, fine-grained access by service delivery point
    - LDAP v3 compliant integration
    - SSL secured communications
52. The MDMS shall support system integration security, including:
    - Web-services/ SOAP protocol and JMS integration requiring username / password authentication
    - Keystore used to manage certificates and access credentials
    - Support for Mutual or 2-Way authentication
    - SSL secured communications
53. The MDMS's underlying data shall support the following security mechanisms:
    - Role-based security for database and application administration, application operations and execution, ad-hoc read-only privileges

- AES-256 bit encryption for persisting sensitive data at rest
- Key store to manage certificates and access credentials
- SSL secured communications

54. The MDMS shall provide a customer portal offering which provides the following functions:
    - Produce interactive charts & heat maps that toggle between interval, hourly, daily and monthly usage
    - Compare monthly usage with nearby consumers, i.e. neighborhoods or with the entire utility population
    - View graphical representation of monthly usage totals and bills for past 2 years
    - Set energy markers to note efficiency upgrades
    -

1.1.3 Mandatory Requirement:

1. The bidder should have experience of integrating its system with GIS(ESRI) System, SAP System and SCADA / DMS
2. MDMS should have capabilities to deliver all the technical and functional requirements including integration with third party system at MDMS end along with legacy system integration as detailed in the Figure 4.1.
3. The Bidder should have experience of integration with utilities legacy system working on MIOS base on SQL Database and Corporate Website.
4. Bidder should have experience of successfully deployment of Energy Auditing, Virtual metering, Billing Determinant, VEE, Revenue protection module in at least 2 separate utilities.
5. Bidder should have experience of integration of Customer Web Portal & Mobile App with MDMS as per features mentioned in technical requirement.
6. Bidder should be capable of integration of existing Revenue protection logics of TPCODL and should also be capable of catering to future requirement and changes in addition to their standard revenue protection module.

1.1.4 Performance Requirement

Required reports to check performance should be provided by bidder

- MDMS should be able to process the data of 0.5 Million meters interval data of 1 day in 6 hrs and move the data to other integrated application.
- MDMS should be able to process and generate billing determinants of 0.5 million meters within 8 Hours this will include receiving the data from HES, calculation of billing determinants and posting the data in billing engine and generation of all exception reports related to billing parameters.
- MDMS should be able to generate billing determinants of meter with in 1 hour after receiving it from HES system and post it into billing engine.
- Customer Data : Customer should be able to get data from system from Portal/App within 5 Sec to 20 Sec on varied Use case
- BCM and CRM on Realtime – for single customer use case with in 5 sec.
- Data Transfer between Systems within 6 hours with up to 10 systems during midnight to 9 AM.
  a. MDS
  b. SMRD, AMR, Feeder Meters Reading System (MDAS RAPDRP and IPDS / DDUGJY)
  c. AMI HES
  d. GIS Incremental Daily Data

e. BI Data
f. Network Planning software
g. SAP ECC
h. CRM
i. Customer Portal

1.2 Current Hardware Details:

1.2.1 SAP Landscape:

Bidder will have the flexibility to utilize the existing hardware infrastructure available with regard to SAP platforms. Following table gives the overview of TPCODL's present SAP's landscape.

Server			Cores			SAPs		RAM(GB)		Software
S.no	Model	Partitions	Max. Scalable	Physical	Active	Per Core	Offered	Available [GB]	Max Scalable [GB]	OS
SAP – R3 Production Data Center 1										
1	P7+780	DB	64	16	14	3651	51114	336	4096	AIX 7.1
2	P7+750	CI	32	16	10	3125	31250	160	1024	AIX 7.1
3	P7+730	APP 1	16	16	14	3047	42658	224	512	AIX 7.1
4	P7+730	APP 2	16	16	14	3047	42658	224	512	AIX 7.1
5	P7+730	APP 3	16	16	14	3047	42658	224	512	AIX 7.1
6	P7+730	APP 4	16	16	14	3047	42658	224	512	AIX 7.1
SAP – R3 Production Data Center 2										
1	P7+780	DB	64	16	14	3651	51114	336	4096	AIX 7.1
2	P7+750	CI	32	16	10	3125	31250	160	1024	AIX 7.1
3	P7+730	APP 1	16	16	14	3047	42658	224	512	AIX 7.1
SAP-R3 Development										
1	Power 6	DB+CI	4	4	4		6000	32	32	AIX 7.1
SAP-R3 Quality										
1	Power 6	DB+CI	8	8	8		16000	64	64	AIX 7.1

Table A

System Configuration:

The System Supplier is requested to propose a system configuration that will support the technical and operation environments outlined in the previous sections and meet the system size, performance, availability requirements.

System Environments

- The proposed solution should be On-premises.
- The configuration - including LAN / WAN and wireless communication modules as well as application, database, communication servers - shall support the following environments:
  - Development environment
  - Testing Environment
  - Production environment
- Bidder should provide all related IT- Infra requirement (Servers, switch, racks, routers, database license, Operating system License, storage, Security solution

(like reverse Proxy), Gateway servers, etc.) in following format mentioned in table no.1.8. The IT infra requirement should be provided after considering existing IT infrastructure compatibility with TPCODL as defined in Table A. Bidder are requested to study existing TPCODL infrastructure, with TPCODL IT team before submission of the Bid document, if required. If any changes in existing IT infra is required for integration with proposed solution the bidder should separately specify the same to TPCODL. The suggested IT-Infra should be able to support the suggested systems for six years.

- Database proposed should be latest enterprise version of Oracle database. Native security features of native Oracle Database should be leveraged to provide additional security layer. Detailed system architecture to be provided by the bidders for system proposed.
- The Proposed hardware infrastructure should be for TPCODL's primary and secondary datacenter considering DR replication. Within the completion of project i.e user acceptance, the final bidder will conduct one DR drill in which complete MDMS solution should work from back up datacenter with least impact to users
- IT hardware for DR replication for development and test system is not required, DR server and configuration is required only for production environment.
- The proposed storage and SAN solution should be enterprise class
- The proposed storage and SAN solution should have redundancy feature
- All relevant accessories required for the storage solution implementation shall be provided by the bidder

Table 1.8

Name of the IT-Infra Component	Specification	Qty.

1.2.2 Cyber Security

Smart grid networks introduce a variety of new and attractive ways to increase communication across the distribution system. However, these network entry points also can increase exposure to potential attackers. If left unsecured, these potential vulnerabilities might allow an attacker to penetrate the network, gain access to control software, and alter load conditions to destabilize the distribution grid. The communication security solution should address these risks with an end-to-end security solution that addresses each area of the network, including:

- The Head-end system
- Backhaul communication over the Wide Area Network (WAN)
- Local Area Network layer communication (LAN)
- Physical protection of the network devices
- Mobile Administration Tool security
- Home Area Network (HAN) security
- Bidder to ensure that there is “Zero” cyber security breach at HES while the data is travelling from meter to the output of HES.

- Third party cyber security assessment has to be done by bidder through CERT-in certified agency.

Solution provider comprehensive approach should include risk assessment, threat modelling and ongoing penetration testing to identify threats and improve security responses. This approach enables the security solution to evolve as technology advances and as threats to grid security inevitably multiply and diversify.

1.3 Functional Specification:

1.3.1 Cyber Security:

- TLS 1.2 or above & LDAP support
- Compliance to enforce CIA (confidentiality, integrity, and availability) best practices at system level
- Role-based access control
- Security configuration
- System should maintain audit trail of all successful and unsuccessful activities and any changes made
- Penetration testing by a Cert approved Agency on roll out at the time of Major changes in the solution and once in a year. The selected vendor should mitigate identified gaps with no extra cost to TPCODL.
- It will be responsibility of bidder to ensure that there should be “Zero” cyber security risk

1.3.2 System Sizing and Scalability

System Sizing:

System Sizing to be based on considering approx. 3 lakh endpoints with a data storage of 5 years for maximum of 16 channels 15 Minute of interval data along with all other type of meter data.
Performance criteria to be followed as mentioned in the RFP.

Scalability:

Users accounts should be easily added as system grows. There should be no upgrade involved and no pre-defined limits upto a maximum of 500 users with different roles.

Interoperability:

- Support for SCADA services
- Integration with existing applications & technologies (refer figure4.1)

System Requirements/ Compliance Sheet

This appendix enumerates the communications, performance, and security requirements for AMI systems.
Respondents must clearly indicate the item number to which their response applies, using the item numbers listed in the table below.

Item Number	Item Section	Item	Requirement
1.1	Performance	Meter reading throughput	Provide production statistics from customer site where the proposed solution is deployed, demonstrating the time it takes to “sweep” (collect all necessary interval data from) all meters in the network. Also, indicate the total number of meters deployed.

2.1	Security	Authorization	Describe how your solution determines whether or not a user is allowed to access the system, and how it determines what functions a user is allowed to perform (authorized).
2.2	Security	Authorization	Describe how your solution determines whether or not an application is allowed to execute a command on the device and how it determines what functions the application is allowed to perform (authorized).
2.3	Security	Key management	If your devices use “keys” — secure identifiers for device or user authentication - what type of keys are used, how are they deployed into the system?
2.4	Security	Key management	Are keys per-device/per-user, per- application, or shared by all authenticated/authorized elements of the system?
2.5	Security	Key management	Are keys one-time (static) or can they be changed (ephemeral)? If ephemeral, how are they changed? Additionally, provide performance data on how long it takes to change per-device/per- user, per-application, or system-wide keys.
2.6	Security	Data/channel privacy	Is data in your solution kept private (protected from unauthorized interception) during transmission over the network encrypted If so, describe how this is achieved.
2.7	Security	Data/channel privacy	Is data in your solution kept private at rest on the device as well as the back-office? If so, describe how this is achieved.
2.8	Security	Data integrity	Is data integrity (correctness) maintained during communications transfer and/or storage in your solution? That is, is data protected from corruption due to bit errors during communication, storage or memory corruption while at rest, etc.? If so, describe how this is achieved.
2.9	Security	Individual device compromise (mitigation)	Describe any protections in your solution against compromise of new devices before they are deployed in the system.
2.10	Security	Individual device compromise (mitigation)	Describe any device -level protections in your solution against “hacking” — compromise of individual devices after they are deployed in the system.

2.11	Security	Viral attack mitigation	Describe any network-level protections in your solution against viral attacks - mass transmission of unauthorized commands, injection of malicious code (“viruses”), etc.
2.12	Security	Insider threat mitigation - field tools	Describe any protections present in your solution against malicious use of authorized devices (specifically, field tools), due either to theft of such devices or insider malicious use.
2.13	Security	Insider threat mitigation - back office software	Describe any protections present in your solution to mitigate malicious operation of back office software, specifically by authorized but malicious insider operators.
2.14	Security	Independent penetration testing	Provide evidence of independent, 3rd party penetration testing performed against your solution.
2.15	Security	Using native security features of database	Describe which native security features of proposed database will be used and how?
2.16	Security	Security Threat / Risk analysis	Describe the mechanism you follow to keep watch on current cyber threats and risks. How you incorporate appropriate mitigation measures in your system and deploy them at client side?
2.17	Security	Audit Trail	Describe how and to what extent audit trails are maintained?
2.18	Security	Disaster Recovery	How disaster recovery scenario will be managed? What manual changes / actions are required, if any?
3.1	Deployment/Operations	Asset management	Does your solution provide a mechanism for capturing and storing location information for installed field devices? If so, describe the mechanism.
3.2	Deployment/Operations	Meter	Once a meter has been properly electrically installed in the field, describe what additional manual steps are required to join the meter to the system.

3.3	Deployment/Operations	Disaster recovery	Describe your standard datacenter hardware configuration and software deployment architecture for supporting 2 million meters using your software system. What are the standard Recovery Point Objective (RPO) and Recovery Time Objective (RTO) based on this configuration? RPO is defined to be the maximum period for which data might be lost from your system in the event of a catastrophic failure such as loss of an entire datacenter; RTO is defined to be the time it takes to recover the service completely from a similar catastrophic failure. Does your software support deployment in multiple data centers, such that in the event of failure or disconnection of one data center, the system "fails over" to use the software in the other data center? If so, provide evidence of having tested such a scenario and evidence of how long the failover process takes on average.
3.4	Deployment/Operations	Software integration	Describe the standard interfaces you support for integrating with other back office software systems such as CIS, HES, Asset Management and Outage Management. If your solution does not support standards, are you willing to provide published documentation of the protocols used?

1.4 Solution for Meter Data Management

General: Following functionalities are required in MDMS

- Input, process, store, and analyze consumption, demand, event and interval data from multiple AMI data collection systems.
- MDM will broker/route read requests to the correct meter reading system for each meter.
- Support net metering (metering net consumption and energy demand for customers have distributed generation such as photovoltaic on their premises).
- Support bidirectional metering.
- Input, process, store, and analyze non-billing meter data such as pulse, voltage and power quality data as they are available from AMI.
- Support schedule and on-demand meter reads and pinging of meter energized states by authorized users and by other utility systems.
- Provide the capability for the utility to schedule reports and to do ad-hoc query and reporting.
- Provide web-based user interfaces.
- Pre-Payment Support. The MDM should support the pre-payment capabilities.

- Should be interoperable with multiple head-end system of different make
- Capable of integrating with other application through Enterprise Service Bus
- Provide analytical and reporting system and allow access and extract data in common file (e.g. Excel and Access) format.
- Should have revenue protection module with TPCODL defined logics.
- Device management support.

- Virtual metering which can support more than Energy Audit and Network Planning tool (Cyme Dist)

1.5 Data Repository

1. Provide online data versioning (i.e. keep versions of the data for audit trail purpose) and storage of register-reads, consumption, interval data, event data, and other meter data.
    - Register Reads. The system shall support storage of direct register reads by billing cycle, daily, hourly, or any appropriate acquisition frequency.
    - Consumption. The system shall support storage of consumption by billing cycle, daily, hourly, or any appropriate acquisition frequency.
    - Interval Data. The system shall support storage of interval data (with DIP 5 Min to 60 min) by channel and acquisition frequency (5 min to 24 hours) for all applicable data types.
    - Event Data. The system shall support storage of all collected event and alarm data from meters, network equipment, and MDMS itself.
    - Other Meter Data. In addition to kWh or kVAh data, the system should have the capacity to store other potential meter data, for example, kW, kVA, blink counts, voltage, sag & swell, and power quality measures such as harmonics.
    - Billing Determinants. The system shall store derived billing determinants and versions of data (interval data, consumption data, etc.) used to calculate them. Billing determinants consist of data for the SAP-ISU billing application to determine the bill amount without having to do any complex calculations (or any calculation at all. This requirement assumes MDMS will be used for complex billing rates such as Peak-Time Rebate in the future instead of SAP-ISU.)
    - Virtual metering: The system should be able to calculate virtual channels / register for billing and Energy Audit purpose and Network Planning purpose.
    - Net Metering: The system should be able to generate billing determinant directly from Net Meters using register read or 15 minute interval data, as well as from set of multiple meters using virtual metering component for normal Billing, TOD and Open access consumer.
    - Data Integrity: MDMS Vendor has to ensure the data integrity i.e. data is coming from Head end system is not edited / deleted / modified and is maintained with proper versions no.
    - Instantaneous Data: This system should record instantaneous Voltage, Current of all three phases, Active, reactive and Apparent Power and should be able to plot the same in Vector form.
2. The system shall have built-in processes to archive data to external data storage.
3. Facilitate online access to all data by authorized users and other utility information systems and applications.
4. System should have graphical representation of interval data for editing.

1.6 Meter Data Processing and Analysis Revenue Management

1. Analyze meter tampering flags, power outages, and usage trends to find potential revenue protection issues and generate alerts and notifications automatically.
2. Analyze consumption to detect potential irregular usage of electricity and generate notifications.
3. Monitor “consumption on vacant/not in use premises” (registered reads above utility configurable thresholds without an active customer account) and automatically generate alerts and notifications.
4. Analyze potential tamper events as per Legacy logics of TPCODL which will be shared during project implementation phase. This will required Universal calculation Engine with Logical, Mathematical and Statistical operators
5. System should be able to run different custom defined logics for capturing revenue leakage.

1.7 Summation and Aggregation

1. Capture and aggregate metering data from a specified number of arbitrary physical meters. Allow system and user access to the aggregated data as if the aggregation is from a meter (virtual meter).
   This capability will support consolidated billing, load research, transformer load management, etc.
2. Synchronize demand and energy reads to determine total demand and summation energy for a user-selected set of meters (the virtual meter) by scheduling demand and bill reads of the meters via the AMI head-end at a user-specified time.
3. Net metering - aggregate data for a specified number of service points or channels with the ability to totalize data across multiple channels of the same meter ID. (Net kWh consumption is calculated by deducting the kWh from premise to utility from the kWh from utility to premise for each meter read interval. Objective is to bill customer for the net consumption (and/or demand) in case the customer has a Distributed Energy Resource such as Photovoltaic.). These can be direct register read from Net Meters.
4. Bidirectional metering - provide the ability to totalize positive and negative meter read values across multiple channels of the same meter ID separately.
5. System should have the provision of mapping the Virtual meter with physical assets.

1.8 Validation, Estimation, and Editing (VEE)

1. Perform programmatic data integrity checks including for example, checksum, time check, pulse, and overflow, on all metered data received from data collection systems.
   - The system shall identify, flag and timestamp any missing or corrupt data and generate reports. Validation rules shall be configurable by data type (e.g. interval data, load survey, midnight data, billing data), meter and AMI technology, and customer class.
   - The system shall provide a Graphical User Interface (GUI) for configurable validation parameters and support the ability to configure validation rules for specific data type, meter and AMI technology, and customer class.
   - The system should also notify the list of meters that have missing or corrupt data and should provide tab for command to pull data for those meters.
   - System should also populate the report of the meters whose data is not received even after set no of retries.

- System should also report list of the cases which have been estimated earlier but now actual data has been reported by system.
- System should have provision of plotting all non-communicating meters on Google/GIS map to identify problematic geographical area if any.

2. Perform data verifications for zero consumption, daily high/low consumption limits, billing cycle, etc.
    - Zero Consumption. The system shall identify any meter with no change in registration for a programmable number of days and generate alerts/notifications as appropriate.
    - Daily Consumption Verification. The system shall identify any meter daily usage above or below a programmable threshold and generate alerts/notifications accordingly.
    - Billing Cycle Verification. The system shall identify any meter with cumulative usage since the last bill greater than a programmable threshold and generate alerts/notifications. The utility will be able to set different programmable thresholds for different customer types and tariffs.
    - Complex Daily and Billing Cycle Verification. The system shall perform the same checks for all daily and billing quantities including demand and coincident demand for active, reactive, and apparent quantities across monthly billing, Time-of-Day/Use, and interval data.
    - Comparison of consumption calculated by load profile and that calculated from registered reads. The system shall generate an error notification when the deviation exceeds a utility specified threshold (e.g. 100 kWh or 0.01% of total consumption and these threshold should be user configurable).
    - System should be flexible to generate user defined reports for reading quality check.
3. Automate estimation and allocation routines based on programmatic rules and historical data.
    - The system shall flag all estimated or allocated data, identify data gaps (where automatic estimation and allocations cannot be accurately performed), and generate alerts/notifications for manual data editing. The estimation shall cover all data types, from the meter, whenever applicable.
    - The system shall provide a GUI for configurable estimation parameters and support the ability to configure estimation for specific meters/accounts or groups of meters/accounts. Additionally the system shall support the ability to establish specific thresholds or boundaries for estimation on specific accounts by meter/customer, group, tariff/rate, or energy provider. Exceeding such a threshold post estimate would flag the need to manually edit the data.
4. Allow manual editing of missing or estimated/allocated data.
    - A GUI must be provided for the user to view and manually edit missing data and allocated/estimated data.
    - The system must clearly distinguish visually between metered and estimated/allocated data with stamping of authorized user.
5. The system should include a graphical user interface to highlight the success read rate and the system should have both manual and automatic “Retry-After-Failure” capability in case the success rate is lower than the required performance requirements.
6. System should have intelligence to identify between missing intervals and power failure while applying VEE.

1.9 Audit Trail

1. Store and provide versioning of all raw data entry and data edits, including direct meter

register reads, estimated, allocated, edited and otherwise derived data.

2. The system shall track all meter data through its lifecycle from direct meter reads to billing determinants, including automated estimations and adjustments by the system and user edits in MDMS.
3. All data entries and changes shall be logged and time stamped. ID of the user who edited the data shall be part of the log.
4. Track the data collected versus the data exported to billing and the time relationships of each. 99.9 % of the data downloaded should be exported to SAP for billing. Report of the meters which have not been exported should be provided on monthly basis and user defined interval.

1.10 Billing:

- System should be able to calculate 99.9 % of the billing determinants out of the cases correctly downloaded. There should be reporting on real time basis for all the meters for reading schedule.
- Schedules of billing determinant should be mapped with reading schedule of SAP and with HES.

1.11 Scheduling

- Schedule meter reads as needed for in-cycle billing reads, off cycle meter reads for move in & move out, and special reads for re-bills, etc. Request for same will be send vide notifications from SAP to MDMS on real time basis.
- System should be capable of configuring billing cycle of same meter like changing schedule meter read and billing date.
- Calculate billing determinants on schedule or on request by authorized users or by other utility information systems.
    - The system shall be able to automatically calculate and deliver billing determinants based on billing cycle. The system will have a configurable calendar that matches calendar dates with billing cycles.
    - The system shall allow multiple billing cycles to read on the same date.
    - The system shall be able to calculate and deliver billing determinants based on ad hoc requests from CRM or an authorized user. The request will have at a minimum the end date for the billing period. The system shall be able to infer the start date based on the date when billing determinants were last calculated.

1.12 Billing Determinants

- Support the processing of consumption reads and interval data into billing determinants to support total consumption, demand, and time-of-use (TOU), and maximum-demand rates.
- Allow the utility to configure multiple TOU options (e.g. the number and duration of TOU rate periods) by customer type, tariffs, and by season.
- Allow the specification of holidays and recognize that these days fall into the off-peak category and for defining different Time of User settings.
- Support conjunctive billing where interval data is totalized across multiple sub-meters into one master meter (virtual metering) prior to aggregating the consumption and demands into the appropriate TOU periods. The system shall be able to identify meters that are part of a conjunctive relationship. (Sub-meters and master meter can be located in different locations far from each other)
- Support consumption adjustments where interval data is adjusted by a certain fixed percentage due to a variance in the service voltage level. The system shall be able to identify meters that require an adjustment.

- Support transformer loss factor adjustments where interval data is adjusted by fixed percent due to various loss factors. The system shall be able to identify meters that require an adjustment.
- Allow users to view, print, and modify the aggregated data prior to sending to CRM for billing.
- Support calculation billing determinant from a set of meters where consumption of all meters are totaled and MDI of one meter with highest is used.
- Supports calculation of meter determinant with special logics / legacy logics.
- The system should able to take data from different HES / Meter Data Acquisition Systems for determining billing determinants.

1.13 Meter Asset Management

- Monitor and identify meter diagnostic flags such as stop-meters for automated event notifications.
- Generate service order requests for scheduled meter tests and battery replacements, etc. Support exchange-on-test processes.
- Track and maintain meter to communication module and communication module to network connectivity, meter and communication module configuration, firmware revisions, etc.
- Track and maintain data route of meters and report if these is a mismatch in expected route.

1.14 AMI System Management

- Automatically generate service order requests based on diagnostic events from the AMI system and equipment.
- Capture and track resolution of data exceptions, product problems and failures, etc.
- Collect AMI system performance data, trend performance over time, and generate reports.
- The MDMS shall be able to synchronize the system time with the AMI head-end to a single system time source to be specified by the utility, to within thirty (30) seconds to top of the hour (e.g. synchronized at 07:00, 08:00, 09:00, etc.)
- System should be able to generate the report of the meters which have a deviation in time of more than 1 hour and if the meter is billed in TOU or open access basis should not be corrected on its own.

1.15 Customer Service Support

- Provide online web access through the utility Customer portal to current and historical consumption and interval data. The MDMS customer portal services to be integrated within the SAP to have a unified customer self-service avenue.
- Automatically generate high/low consumption alerts.
- Execute disconnect/reconnect service orders from an authorized user via multiple remote disconnect and re-connect AMI systems.
- Execute disconnect/reconnect service orders from an authorized user via “virtual disconnect” → automatically set the daily consumption monitoring threshold to the utility configurable level and generate “consumption on vacant” alerts or notifications when the threshold is exceeded.
- The consumption threshold may be set by consumption (kWh / kVAh / kW / kVA / pf) or percentage of historical daily average. Different thresholds may be set for different customer and rate classes.
- Automatically notify customers of significant events or customer preset thresholds such as

a demand threshold, power factor threshold, critical peak period or month-to-date bill thresholds via e-mail, telephone, or text message using the utility's existing multimedia communication infrastructure.

- Should have provision of estimation of bill of the consumer on request of consumer through proper authorization.

1.16 Real-time Applications Support

- Support requests for on-demand reading and pinging of meters from users directly or from other utility systems and applications.
- Process meter outage notifications (last gasps) and restoration events (first Breath), filter the events against known service orders based on the utility business rules, and relay the messages to OMS. Should have ability to distinguish fictitious signals and momentary power failures and isolate them. OMS system should not be flooded by these notifications and intelligence should be built in. Storm mode, work order open, scheduled outage should be filtered out. If a feeder is out then notification should be generated intimating that feeder is out rather than for all the meters down.
- Process events such as demand threshold, high/low voltage, etc.
- The system shall capture date and time stamp receipt of all device and system events when received by the system (in addition to the date and time stamps coming from the AMI meters or communications equipment).
- The system shall log all events for post incident tracking.
- System should filter out all the reading in which date time stamp of meter data received from the meter and that of system is more than 1 hour should be flagged.
- BI system may want to use real-time data analytics i.e. without transferring the data to other system, but to run the query in the MDMS system along with and/or logical joining of other data sets.
- Workflow required Data from Legacy TPCODL Applications, SAP or Enterprise Content management System kind of applications.

1.17 Planning and Engineering Support

- Support load profile analysis and display for any user specified virtual meter or set of virtual meters.
- Support “system load snapshot” by collecting meter reads at a user specified date and time.
- Allow the authorized user to cancel a “system load snapshot” after it has been configured in the MDMS.
- Enable export of meter data (Billing, load profile), “system load snapshot”, voltage, power quality, etc. to a common file format (e.g., Excel, Access, etc.).
- Virtual Metering. The system shall capture and aggregate metering data from a specified number of arbitrary physical meters. Virtual meters shall support all metering functionality allowed by the lowest common device capability.
    - The system shall have a user interface to enable a user to create virtual meters and assign physical meters to a virtual meter or remove physical meters from a virtual meter.
    - The system shall allow the user to add or remove one or more physical meters from a virtual meter.
    - The system shall allow assigning one physical meter to more than one virtual meters.
    - The system shall be capable of receiving virtual meter relationships from an external

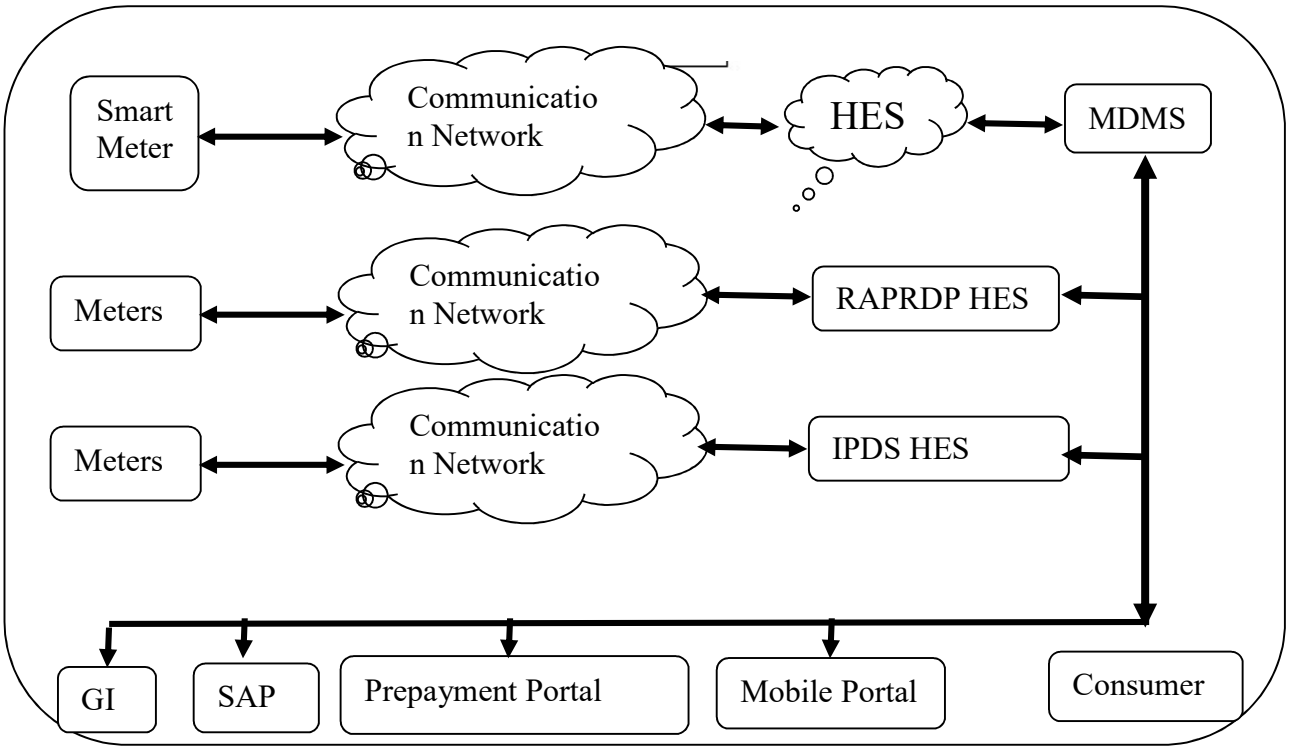
system such as GIS / BI / Homegrown Application or a distribution engineering analysis application.

- Load Profile
  - Display load profiles by season and day type (weekday, weekend, holiday, etc.) and by rate class, customer type, or any user specified collection of meters.
  - Allow the user to export the raw load profile data to a common file format such as Excel and Access.
  - Allow access and export to common file format (e.g., Excel and Access) other AMI meter data such as voltage sags and swell, and power quality.

1.18 System Integration Requirements Solution Architecture

The conceptual solution architecture for integrating AMI head-end and MDM with other TPCODL information systems is depicted in the following diagram. This section describes the system interface requirements assuming full AMI deployment. Please refer to Section 5 Implementation Plan regarding the interfaces to be developed in each phase of implementation.

The solution architecture is depicted in the data flow diagram. (Figure 4.1)
The system interfaces needed for the solution architecture are summarized in **below.**



Proposed Architecture
Figure 4.1

2. General Requirements

- The system shall include Application Programming Interfaces (API) and/or adaptors to support system integration with other information systems as outlined in this section.
- The system shall comply with the latest version of the IEC 61968 Common Information Model (CIM) and shall continue to comply with future versions through annual software maintenance program.
- Support interfacing with multiple metering systems in general. Integrate with the data collection systems to provide the functionality specified above.
- Allow other systems and applications to access “real-time” data (such as on-demand reads and meter pings, outage and distribution automation events), and historical information (such as meter reads and AMI system service histories.)
- System should be operating on Oracle data base 12 C or Above

2.1 AMI Data Collection/Head-end System(s) - MDMS Integration

- AMI System Deployment Status. AMI head-ends shall send to MDMS installed AMI meters status.
- Meter/Module Configuration Synchronization. AMI Data Collection/Head-end shall synchronize with MDMS meter/module configuration including time at least once per day.
- Real-time Read/Status Request & Response. MDMS shall send to AMI Data Collection/Head- end at the request of a CSR or other user to do on-demand read/status in “real-time” when schedule read/status is not adequate. AMI Data Collection/Head-end will send back to MDMS real-time read/status.
- Real-time Event Notifications. AMI Data Collection/Head-end shall notify MDMS of the event such as outage in real-time when meter losses power more than a configurable time duration.
- Scheduled Meter Read Data. AMI Data Collection/Head-end shall send to MDMS the meter read data as scheduled at least once per day.
- AMI System and Meter Events. AMI Data Collection/Head-end shall send to MDMS AMI system and meter events such as meter diagnostics.
- Demand Response events, start & end date/time. MDMS system shall send to AMI Data Collection/Head-end demand response events including start and end date/time to reduce demand when the system demand is likely to be highest. In consequence, AMI meter will relay to DR in-home devices and in-home display. AMI Data Collection/Head-end will send to MDMS demand response status.

2.2 MDMS Integration SAP CRM

- AMI System Deployment Status. MDMS will notify CRM of installed AMI meters, the MDMS has actually heard from the AMI head-ends.
- Billing Read Schedule. CRM shall send to MDMS a bill read schedule such as the last daily read for a specified meter.
- Scheduled Billing Reads. MDMS shall send to CRM at the request of a Customer Service Representative or other user the most current read of a meter as scheduled, which is usually the last daily read (this should suffice for most billing inquiries). The user can choose to do on-demand read in “real-time” only if the last daily read is not adequate.
- On-demand Read. If the scheduled billing read is not adequate. CRM or the user can choose to do on-demand read in “real-time”. CRM shall send to MDMS an on-demand read request for a specified meter.

- On-demand Read Results. MDMS shall send to CRM at the request of a CSR or other user the on-demand read results if the scheduled billing read is not adequate.
- Edited Meter Read Transactions. CRM shall send to MDMS on an event basis consumption and demand data used for billing, which has been edited within CRM, usually during a rebate or rebill scenario.
- Billing Determinants. MDMS shall send to CRM the billing determinants for on-cycle scheduled reads or off-cycle requested reads.
- Billing Determinants Request. CRM shall send to MDMS a request the MDMS to send billing determinants for off-cycle reads. This interface can also be used by the utility to request on- cycle reads. The request will include the meters to be read and the billing date. A request can have a billing date in the future or the past.
- Consumption Alerts. MDMS should send to CRM consumption alerts for virtual disconnects or prepay accounts based on the utility's configurable thresholds. This interface will be on an event driven basis.
- Disconnect/Reconnect Request/Response (Virtual, Remote, And Physical). CRM shall send to MDMS requests disconnect and reconnect specific accounts. CRM will notify MDMS if these actions are to be virtual disconnect, remote disconnect/reconnect, or physical onsite disconnect/reconnect.
- Revenue Integrity Alerts/Notifications. MDMS shall send to CRM alerts/notifications for tampering, consumption on inactive meters, etc.
- Tariff Changes. CRM shall send to MDMS tariff change (e.g. TOD, TOU) when there is change in Tariff structure or programs.
- Customer Information Update. CRM shall send to MDMS customer information update.
- New Installed Meters. CRM shall send to MDMS information on new meter installations.
- Integration with Current SAP Landscape and its existing business processes
- Integration with SAP ISU would be done in a hybrid manner where in SAP AMI interfaces will also be used for some quantum of meters and for rest of the meters the bidder is expected to create custom interfaces to meet all sort of use cases while integrating with MDMS.
- All custom interfaces development in SAP and integration with MDMS should be carried out by the successful bidder

  In Schedule for items, Club point 2a and 2b make it a single quantity of 3,50,000 meters (no need to mention the break-up of Smart and Non Smart meters for licensing perspective)

  In point 2c, Incremental at the rate of 50,000 end points for Smart Meters shall be replaced to 50,000 meters only

2.3 SAP / Third Party Prepay Application

- Disconnect/Reconnect Request: SAP/ Third Party Prepay Application shall notify MDMS when the consumption of a customer enrolled in pre-pay reaches one or more configured threshold levels.
- Prepay Accounts: SAP/ Third Party Prepay Application shall send MDMS prepay account information of a customer enrolled in pre-pay.
- Interval Meter Reads: MDMS shall send SAP/ Third Party Prepay Application interval meter read of a customer enrolled in pre-pay.
- System should have provision of reading the meter at a higher frequency if meter is tagged as pre-pay meter.

- Prepay Application must be well integrated with SAP ISU Modules/ SAP BI/ SAP CRM.

2.4 Device Management (DM)

- AMI Meter Service Requests. MDMS shall send to DM AMI meter service requests for activities for ad hoc or scheduled service activities such as a dead meter or battery replacements. DM shall return completion information to the MDMS upon completion.
- AMI Meter Service Completion. DM shall return completion information to the MDMS upon completion of AMI Meter service.
- Customer/Meter Configuration Synchronization. DM shall send to MDMS customer/meter information (e.g., customer account, meter information, commodity, meter route, demand response enrollment, etc.) as needed.

2.5 Customers with AMR

- Daily Bill Read Request: MDMS shall send to C&I Customer AMR manually collected read request for daily read for a specified meter.
- Daily Billing Reads. C&I Customer AMR shall send to MDMS manually collected reads in order to create a centralized data warehouse for all reads collected.

2.6 Demand Response/Load Management System (DR/LMS)

- Demand Response events, start & end date/time. DR/LMS system shall send to MDMS demand response events including start and end date/time to reduce demand when the system demand is likely to be highest.
- Load Profiles. MDMS shall send to DR/LMS system load profiles for analyzing DR events.
- MDMS should be able to create baseline profile for customers through custom defined algorithms based on past data available in the MDMS system.

2.7 Work Management System (SAP PM)

- Service Order Requests: MDMS shall send PM Service order requests as appropriate based on AMI communications infrastructure events.
- Service Order Completion Information: PM shall send MDMS service order status (open and completed) and completion information, which MDMS will use in service and performance historical analysis.

2.8 Outage Management System (OMS)

(Future Requirement- Provision to be kept for integration)

- Outage Verification Request: OMS shall send to MDMS a request to verify a service outage when a trouble call is not part of a known outage. MDMS will perform an on-demand ping to verify the meters are receiving energy.
- Outage Notification: MDMS shall collate the outage notification based on hierarchy as imported from GIS.
- Restoration Verification Request: OMS shall collate the outage notification based on hierarchy as imported from GIS.. This will be done prior to calling back customers via the IVR.

2.9 Multimedia Communication

- Usage Profile, High-Bill Alerts, DR/Load Management Events, etc. MDMS shall send to Multimedia Communication current and history usage profile, high-bill alerts, DR/Load management events, etc. in order to provide to customer through online web access, IVRS, Mobile App, etc.,

2.10 Geospatial Information System (GIS)

- Meter-Transformer Connectivity: The interface shall extract bulk data load and incremental updates of meter-transformer connectivity data from GIS and load the data in the MDMS distribution network model. The interface should synchronize the data in GIS and MDMS on a daily schedule or as changes are posted to the GIS master database (event driven).
- AMI System Asset Data: The interface will synchronize the AMI system asset data between AMI head-end/MDM and GIS, including new assets, required assets, and changes to asset connectivity and status.
- MV & LV Connectivity: The interface shall extract bulk data load and incremental updates of MV & LV connectivity data from GIS and load the data in the MDMS distribution network model. The interface should synchronize the data in GIS and MDMS on a daily schedule or as changes are posted to the GIS master database (event driven). The Connectivity Details & Event Details would be shared during Blue Printing Stage.

2.11 Network Planning Tool& BI Requirement

- Load Profiles. MDMS shall send load profile data to the Network Planning Tool.
- Aggregated Load. Based on the meter-connectivity, MDMS shall send to the Network Planning Tool application monthly the peak load of transformers based on aggregated loads of meters served by the transformer.
- Loss Calculation. Calculate the total, technical and non-technical losses of the LV network supplied by a Power Transformer by subtracting the aggregated consumption reads of meters on the LV network from the meter read at the PT.

2.12 Distribution Planning

- Load Profiles. MDMS shall send load profile data to Distribution Planning
- System Load Snapshots/Save Cases. MDMS shall send system load snapshot (i.e. synchronized demand reads) to Distribution Planning.

2.13 Distribution Management System (DMS)

- Load Profiles. MDMS shall send load profile data to DMS.
- Meter Load. MDMS shall send system load snapshot (synchronized demand reads) to DMS.
- Voltage. MDMS shall send voltage data from select meters to DMS.

3. Other Enabling Applications

3.1 DER:

The system requirements specified above can also support enabling applications such as DER Distributed Energy Resources (DER)

The following AMI functions that have been specified above will be useful in integrating DER such as photovoltaic generation (PV) into the utility distribution network:

- Interval reads and load profile to detect the presence of customer-owned small PV units
- Meter read summation and aggregation if the PV is separately metered (by a sub-meter or via a separate channel of the same AMI meter)
- Net metering and detection of reverse power flows to protect safety from reverse flows from the PV back to the distribution network. (Standard DER protection guideline is to

trip the DER off the distribution grid when a power outage is detected. This requirement is intended to give system operations a backup safety provision in case the customer DER installation does not follow the standard protection guideline.)

- Another meter defined as solar meter which is connected at the Solar Generation Unit end to measure Solar Generation Only, to be accounted separately against the same Contract account with which the Net meter is attached. From this metering unit renewable power obligation to be calculated for the utility.
- The same unit calculation of Solar Meter can also be required to derive net unit of any other installation solar meter of same customer or can be distributed on contracted % of ownership of any plant on multiple Contract Accounts.
- The Net Meter Unit to be calculated as billing determinant logics as per the prevalent Regulatory Tariff Guidelines. These stages may be advanced or delayed during implementation station if required from business prospects.

3.2 Reports and MIS

Reports/ MIS shall be required to be developed for utilization of data captured from system. Few sample critical reports are as below: [1]

- Report of Meters whose data not received from HES as per schedule
- Reading Quality Check exception reports
- Exception report on cases held up in MDM which are not posted in Billing Engine
- Interface Summary reports for all the system integrated with MDM
- Standard Analytical report as per solution
- Solution should be able to Generate Vector Diagram on the basis of Instantaneous data as well as events data

Detailed reporting requirements will be finalized and signed off during Blue Print documentation stage.

System should be able to generate report in schedule form on daily basis on incremental data basis or total data basis.

4. Evaluation Criteria:

Technical bid shall be evaluated after fulfilment of qualifying requirement (QR). Bids will be considered technically qualified with a score of 35 or above out of total marks as per following matrix.

Sr.	Technical Qualification Criteria	Max
1	**Project Experience**	**40**
a)	Number of MDMS project successfully completed in last 5 years	
	No. of projects - Maximum 3 - Two marks for each project (Max. 6 **Marks).**	

	For each project the scoring criteria will be;	
	For Meters >= 2 Million Meters - （2 Marks)	
	For Meters >= 500 K - (1 Mark)	
	For Meters >= 100 K - (0.5 Mark)	
	For Meters <= 100 K - (Zero Marks)	
	TPCODL reserves the right to conduct site visits of the bidder's completed projects to examine the functionality and integration.	
b)	Project experience in implementation of modules/applications of MDMS - **10 Marks (1 Mark for Each Point mentioned below)**	
	(i) Register Billing and Interval (ToU) / Usage Billing	
	(ii) Group Remote Connect/ Disconnect	
	(iii) Real Time Validation, Estimation & Editing (for register and interval data)	
	(iv) Consumer web portal presentment	
	(v) Rich User Interface experience for supervisor/analyst like team management, dashboard and Graphical Edit and system console for system administration, Exception handling and management reporting.	
	(vi) Real time Device Events handling	
	(vii) Open and flexible reporting and analytics framework: example of sample reports: Theft Flag, Non-reporting meter, failed provisioning	
	(viii) Security of System, transport interfaces, roles, access etc.	
	(ix) Integrated Service order management.	
	(x) Asset/Device management / remote configuration (prov /sync).	
c)	Integration of Legacy System of Utilities with MDMS (2 marks will be allocated to the bidder for integration of legacy system in 2 utilities handling 1 million meters) - **2 Marks**	
d)	Project Experience in integration of IT applications - **20 Marks**	
	The distribution of marks for experience in integration of IT applications is provided as follows:-	
	(i) Relevant SAP modules - (10 Marks)	
	(ii) Cyber Security feature including demonstration - (5 Mark)	
	(iii) DMS and GIS - (1 Mark)	
	(iv) Pre-Payment Application - (4 Marks)	
e)	Project Experience in integration of no. of AMI HES in one project (i) more than 2 HES - 1 Mark	
f)	Experience in implementation of interface used in MDM Systems ESB over SOA - 1 Mark	
2	**Presence in India**	**2**
a)	Bidder should have a registered office in India from last 10 years - 1 **Marks**	
b)	Bidder should have at least work force of 10 persons within India office to support after sales, support and services. Self-undertaking to be provided by the bidder - 1 **Marks**	

3	**CVs of minimum 5 individuals with relevant experience with minimum of 5 years.** ****(purchaser may take interview of employees whose CV has been submitted and no resource diversion will be allowed unless it is produced that employee has resigned from Organization. As the project duration is one year)** **If company is MNC CV credential must have 30% workforce from global team.**	**2**
4	**The bidder shall have deployed the MDMS scalability test for 2 million meters with following use cases :** **a. Processing of billing data** **b. Processing of interval data for 30 min interval**	**2**
5	**Gartner Magic Quarter**	**3**
5a	Presence in Gartner Magic Quadrant – 1 marks	
5b	Presence in Gartner Magic Quadrant Leader – 3 marks	
6	(i) Data Collection and Processing	**9**
	(ii) Generate TOU Usage Billing Determinants	
	PRE-DEMO (To be completed within 15 days of Technical Bid Opening)	
	The Bidder is expected to demonstrate all standard software features necessary for implementation of MDMS system by simulation of MDMS under various scenarios. The Bidder is required to set-up their own system/ server for demonstration purpose.	
	The Demonstration must be based on data relevant to TPCODL scenario. All queries are to be addressed during the demonstration only, and no further opportunities would be presented for subsequent clarifications (if any). ** Adherence to the timings is critical and the overall demonstration should not exceed specified hours.	
a)	Demonstrate the concept of Provisioning - **1 Mark**	
	Demonstrate the concept of Sync asset data for asset information and Move inMove out -**1 Mark**	
	Demonstrate on import of meter Data of TPCODL existing metering system into MDMS system-**1 Mark**	
	Data Collection & Processing and Real Time VEE -**1 Mark**	
	Demonstrate the billing determinants generation (2 register, 4 register and TOU) -**1 Mark**	
	Demonstrate the Virtual metering concept with input in CSV-**1 mark**	
	Demonstrate the remote connect /disconnect -**1 Mark**	
	Demonstrate the non-billing and interval data export -**1 Mark**	
	Demonstration of processing data files from MDS - **1 Mark**	
7	**Hardware Design proposed:**	2
	Additional points will be given to the bidder who will propose leanest design of Hard ware -2 marks	
	Next bidder to the leanest will be awarded -1 mark	
	No marks will be awarded to any other bidder	
Technical Solution Score		**60**

4.1 System Uptime SLA for MDM

Category	Definition	Resolution Time	Acceptable Non compliance	Penalty for Non-Compliance
Level 3 (Critical)	Complete system failure, severe system instability, loss or failure of any major subsystem or system component such as to cause a significant adverse impact to system availability, performance, or operational capability	0-6 hrs.	Once system is in production, occurrence of Level 3 should be restricted to a Maximum of 12 nos in an year or a maximum 2 occurrence in a month.	1% of monthly FMS charges for every incidence of non-compliance beyond the acceptable value
Level 2 (Urgent)	Degradation of services or critical functions such as to negatively impact system operation. Failure of any redundant system component such that the normal redundancy is lost. Non-availability of Man-power at control center during working hours	0-24 hrs.	Once system is in production, occurrence of Level 2 should be restricted to a Maximum of 24 nos in an year or a maximum 3 occurrence in a month.	0.5% of monthly FMS charges for every incidence of non-compliance beyond the acceptable value
Level 1 (minor)	Any other system defect, failure, or unexpected operation. Request for information, technical configuration assistance, “how to” guidance, and enhancement requests.	0-3 days	Once system is in production, occurrence of Level 3 should be restricted to a Maximum of 36 nos in an year or a maximum 4 occurrence in a month.	0.25% of monthly FMS charges for every incidence of non-compliance beyond the acceptable value

4.2 SLA for MDMS :

Sr. No.	Headings	Processing Time	Acceptable Non Compliance Count	Penalty for Non-Compliance
1.	Billing Determinant	6 hours from receipt of data.	3 Times in a month and a Maximum of 24 times for each parameter	1% of monthly FMS charges for every count of non-compliance beyond the acceptable value of each parameter.
2.	Pull Data billing determinant	Immediate Basis		
3.	Data updating in data base after VEE	2 hours		
4.	Revenue protection output after	24 hours.		

	processing of all data as required.			
5.	Virtual Metering Output	2 hours from receipt of data in MDMS from HES		
6.	Mobile App / Customer portal data update on consumer receipt	Update of data after every 2 hours for data received in last 2 hours.		
7	Data sync with GIS	Daily basis.		
8	Data receipt from other MDAS existing	Hourly		
9	All non-critical data sync	24 hrs from receipt of data.		

- Bidder to provide access to complaint management system to lodge complaints and generation of reports for calculation of non-compliance of SLA
- Maximum value of monthly penalty shall be limited to 10% of monthly FMS charges

5. Successful Bidder has to provide detailed documents

- Proposed Solution Architecture with software versions and hardware specification
- Standard Product manuals
- User Manual both for standard and Custom Applications
- Administrative operations manual for Infra supplied
- Configuration document after project go live
- Details Interface technical specification document after go live
- Training manual for user training before go-live
- User License Agreement of all software after Purchase Order placement

6. Facility Management Services (FMS) :

1. Bidder has to provide required trained manpower for one year after go live on site to make sure that MDMS is working as per SLA defined for processing of data.
2. During deployment & in first year of operation after go live bidder has to train TPCODL team for handling minor trouble shootings for keeping system running for day to day activities.
3. During subsequent years of FMS, bidder has to provide off site support for maintaining SLA.
4. Bidder on need basis should depute manpower onsite for 30 hours per year. (All cost of deputing person including travel, boarding and lodging will be on Bidder)
5. FMS will include handling of CRs which include effort level of 2 persons for entire year for first 2 years of FMS.
6. From year 3 of FMS, CRs with an effort level of 30 hrs each has to be handled by OEM.
7. All software upgrades have to be done free of cost during FMS period – All version and patch upgrades are to be executed by the successful bidder with in the FMS period.
8. During FMS in case the billing of the customer is stopped due to system performance or any other bugs within MDMS system, this shall be attended at top most priority and shall be resolved within 12 hours of raising the issue.
9. In case of
10. some % of payment to be released every year so that support is being provided in FMS period properly.

11. SAP AMI usage to be specifically mentioned if not used
12. “The MDMS customer portal services to be integrated within the SAP MCF portal to have a unified customer self-service avenue.” Line in the RFP is not relevant. Instead to be re phrased as “The MDMS shall enable all kind of API’s / Database access to meter data for the utility to develop its own customer portal specific to Smart Meter use cases”

7. List of key abbreviation used

MDMS	Meter Data Management Solution
ISU	SAP - Industry Solution for Utilities
R3	SAP ERP
BI	Business Intelligence (SAP - Business Warehouse/ Business Objects)
BW	SAP - Business Warehouse
MCF	SAP - Multi Channel Foundation (Customer Portal)
CRM	SAP - CRM Module
ESB	Enterprise Service Bus
PI	SAP - Process Integrator
SMRD	Smart Meter Reading Device
AMR	Automated Meter Reading system
HES	Head End System
OMS	Outage Management system
ADMS	Advance Distribution Management System
GIS	Geographical Information System
TOU	Time of Use
VEE	Validation, Editing, Estimation

Annexure VII

General Condition of Contract

CONTENTS	
CLAUSE NO.	**DESCRIPTION**
1.0	**ORGANIZATIONAL VALUES**
2.0	**ETHICS**
3.0	**CONTRACT PARAMETERS**
3.1	Issue/ Award of Contract
3.2	Contract Commencement Date
3.3	Contract Completion Date
3.4	Contract Period/Time
3.5	Contract Execution Completion Date
3.6	Contract Execution Period/Time
3.7	Contract Price /Value
3.8	Contract Document
3.9	Contract Language
3.10	Reverse Auction
4.0	**SCOPE OF WORK**
4.1	Technical Evaluation
4.2	Indemnity
4.3	Display of notice boards at work site
4.4	Disposal of waste at site
4.5	Deployment of workforce
4.6	Damage of Properties
4.7	Issuance of material
4.8	Company's right to use works
4.9	Rights of TPCODL to vary the scope work
5.0	**PRICES/RATES/TAXES**
5.1	For Supply part of Contract
5.2	For Service part of Contract
5.3	Changes in statutory Tax Structure

CONTENTS	
CLAUSE NO.	**DESCRIPTION**

CONTENTS	
CLAUSE NO.	**DESCRIPTION**

CONTENTS	
CLAUSE NO.	**DESCRIPTION**

1.0 ORGANIZATIONAL VALUES

The Tata Group has always been a value driven organization. These values continue to direct the Group's growth and businesses. The Six core Tata Values underpinning the way we do business are:

Integrity - We must conduct our business fairly, with honesty and transparency. Everything we do must stand the test of public scrutiny.

Understanding - We must be caring, respectful, compassionate and humanitarian towards our colleagues and customers around the world and always work for the benefit of India.

Excellence - We must constantly strive to achieve the highest possible standards in our day to day work and in the quality of goods and services we provide.

Unity - We must work cohesively with our colleagues across the group and with our customers and partners around the world to build strong relationships based on tolerance, understanding and mutual co-operation.

Responsibility - We must continue to be responsible and sensitive to the countries, communities and environments in which we work, always ensuring that what comes from the people goes back to the people many times over.

Agility - We must work in a speedy and responsive manner and be proactive and innovative in our approach.

2.0 ETHICS

In our effort towards Excellence and in Management of Business Ethics at TPCODL, an Ethics Management Team is constituted.

The main objective of the Ethics Management Team is to:

1. Record, address and allay the issues and concerns on ethics raised by different stakeholders like employees, consumers, vendors, Associates etc. by initiating immediate corrective actions.
2. Ensure proper communication of the ethics policies and guidelines through prominent displays at all offices of TPCODL and through printed declarations in all concerned documents where external stakeholders are involved.
3. Ensure proper framework of policies as preventive measures against any ethics violation recorded by them.
4. Prepare and submit MIS of all issues and concerns, corrective and preventive actions on monthly basis to the top management for their information.

All members of Team TPCODL, Associates and Stakeholders are requested to submit any grievance on ethics violation to Mr. Rajeev Kharyal, Chief Ethics Counselor.

3.0 CONTRACT PARAMETERS

3.1 Issue/Award of Contract

TPCODL awards the contract to the Associate in writing in the form of Purchase order or Rate Contract (RC) hereafter referred as Contract, through in any or all of following modes- physical handover / post / e-mail / web document / fax with all the attachments/enclosures which shall be part of the contract document

On receipt of the contract, the associate shall return to TPCODL copy of the contract document duly signed by legally authorized representative of associate, within two days of Effective Date of Contract for contracts having contract execution time less than 30 days and within five days for all other contracts.

3.2 Contract Commencement Date

The date of issue/award of contract shall be the Effective Date of Contract or Contract Commencement date.

3.3 Contract Completion Date

The date of expiry of Guarantee Period (detailed in section 12 of this document) shall be deemed as the Contract Completion Date.

3.4 Contract Period/Time

The period from Contract Commencement Date to Contract Completion Date shall be deemed as the Contract Period/Time.

3.5 Contract Execution Completion Date

The stipulated date for completing the execution of all items in the schedule of quantities (Supply, Service and or both as applicable) shall be deemed as the Contract Execution Completion Date.

3.6 Contract Execution Period/Time

The Period from Contract Commencement Date to Contract Execution Completion Date shall be the Contract Execution Period/Time. Timely Completion of Works/Timely Delivery of Materials is the essence of the contract. The period from effective date of contract to the date stipulated for completion of delivery of all items/completion of all the works/services, as per schedule of quantities of the contract is defined as contract execution completion time. The Delivery of Materials /The Completion of Works, as applicable, should be achieved in all respects as per schedules of quantities and all the terms and conditions of the contract, in the contract execution time.

Any revision/amendment in the originally stipulated contract execution time has to be approved by authorized representative of TPCODL.

3.7 Contract Price /Value

The total all inclusive price/value mentioned in the LOI/PO/RC of the contract document is the Contract Price/Value and is based on the quantity, unit rates and prices quoted and awarded and shall be subject to adjustment based on actual quantities supplied/actual measurement of work done and accepted and certified by the authorized representative of the company unless otherwise specified in schedule of quantities or in contract documents.

3.8 Contract Document

The Contract Document shall mean and include but not limited to the following:

- NIT/Tender Enquiry, QR, Instruction to Bidders, Special Condition of Contract (SCC) of tender, GCC, Technical & Commercial Specifications including relevant annexure and attachments).
- Bids & Proposals Received from Associate including relevant annexure/attachments.

- Letter of Intent (LOI/RC/PO) with agreed deviations from the tender/bid documents.
- All the Inspection and Test reports, Detailed Engineering Drawings.
- Material Dispatch Clearance Certificate (MDCC).
- Minutes of Meeting (MoM)

3.9 Contract Language

All documents, instructions, catalogues, brochures, pamphlets, design data, norms and calculations, drawings, operation, maintenance and safety manuals, reports, labels, on deliveries and any other data shall be in English Language.

The Contract documents and all correspondence between the TPCODL, Third Parties associated with the contract, and the Associate shall be in English language.

However, all signboards required indicating "Danger" and/or security at site and otherwise statutory required shall be in English, Hindi, and local languages.

3.10 Reverse Auction

TPCODL reserves the right to conduct the reverse auction (instead of public opening of price bids) for the products / services being asked for in the tender. The terms and conditions for such reverse auction events shall be as per the Acceptance Form attached in Annexure J. The bidders along with the tender document shall mandatorily submit a duly signed copy of the Acceptance Form as mentioned in the Annexure J as a token of acceptance for the same.

4.0 SCOPE OF WORK

All the activities that are to be undertaken by the Associate to realize the contractual deliverables in completeness form Scope of Work. Following clauses list, but not limited to, major requirements of the scope of work.

The associate shall satisfy himself and undertake fully the technical/commercial requirements of items to be supplied as listed in the Schedule of Quantities together with the tests to be performed /test reports to be furnished before dispatch, arrangement of stage and final inspections during manufacturing as per terms and conditions of contract, technical parameters & delivery terms and conditions including transit insurance to be met in order to fully meet TPCODL's requirements.

Completeness: Any supplies and services which might have not been specifically mentioned in the Contract but are necessary for the scope mentioned in Special Terms & Conditions and/or completeness of the works at the highest possible level, including any royalties, license fees & compensation to be paid, whether incurred by the associates or by a third party for the work covered in the scope, regardless of when incurred, shall be supplied/provided by the associate without any extra cost and within the time schedule for efficient , smooth and satisfactory operation and maintenance of the works at the highest possible level under Indian conditions (but according to international standards for facility of this type), unless expressly excluded from the scope of supplies and services in this Contract.

TPCODL have the right, during the performance of the Contract, to change the scope and/or technical character of the Project and/or of the supplies and services stipulated in the

Contract by submitting a request in writing to the Associate. The Associate shall, within fifteen days of receipt of such request from the TPCODL, provide Purchaser with a reasonably detailed estimate of the cost of the change outlined in the request.

In the event, TPCODL requests a change, the Contract price and time shall be adjusted upwards or downwards, as the case may be and shall be mutually agreed to. The associate shall not be entitled to any extension of time unless such changes adversely affect the time schedule.

The Associate shall not proceed with the changes as requested till adjustment of contract price and time schedule where so applicable in terms of or otherwise directed by the TPCODL.

4.1 Technical Evaluation

TPCODL reserves the right to assign scores to different parameters including but not limited to the following while evaluating the bids. TPCODL reserves the right to change the parameters and score without prior information to the associates:

S. No.	Evaluation Parameter	Max. Score
A	**Bidders already Registered with TPCODL**	**100**
A.1.	**Quality of the Products & Services** a. <u>For Supply Part:</u> No Material Rejections in last 2 years Deduction of 3 marks for each PO/ RO (for same product category) with major rejections in last 2 years. (Major rejection shall be considered when material is taken back by the vendor for rectification and the quantity of rejected material is more than 10%). b. <u>For Service Part:</u> No violation of statutory compliances in last 1 year. Deduction of 2 marks for each instance of violation in last 1 year. c. <u>Safety</u> Deduction of 2 marks for each instance of safety violation in last 1 year. Deduction of 4 marks for each reported Non-Fatal Accident in last 1 year. In case of any reported fatal accident: *ZERO MARKS*	12 12 16
A.2.	**Timely Execution of Contracts** Total Achieved Score = {30 – 3 x (Avg. %age LD deductions in last 2 years)}	30
A.3.	**Legal Issues with TPCODL** Zero instances of Arbitration procedures / Court Cases / PBG forfeitures in last 2 years: 30 marks else 'Zero' marks	30
B	**Bidders new to TPCODL**	**100**
B.1.	**Visits** <u>For Supply Part</u>: Factory Visit and Evaluation. <u>For Service Part:</u> Client Site Visit where the bidder is providing similar services. The visits as above shall be arranged by the bidder. However all costs towards conveyance, lodging, boarding etc. shall be borne by TPCODL. The score assigned by TPCODL based on the above visits shall be final and binding on the bidder. **<u>Safety:</u>**	30 20

S. No.	Evaluation Parameter	Max. Score
	Score achieved against the BA safety Management System questionnaire.	
B.2.	**Client Referrals** At least 3 nos. Customer References for similar products/ services in last 3 years. All customer references shall be either of the following: ▪ Govt. Organizations/ PSUs/ Power Distribution Utilities. ▪ Private Organizations with an annual turnover of >= 500 cr. PO copies or Completion Certificates are admissible. Each reference: 10 marks	30
B.3.	**Blacklisting Information** Not blacklisted by any reputed organization / utility in last 2 years: 20 marks else 'Zero' marks.	20

- Bidder shall be considered as technically qualified if they are able to achieve a technical score of >70 marks on the above parameters. 'A' or 'B'.
- The bidder must have the PF and ESI registration. In case it is not there (provided the bidder is not exempted from the PF and ESI), bidder shall not be evaluated on the above parameters and will be considered as disqualified.

4.2 Indemnity

Associates shall undertake to fully indemnify TPCODL (also referred to as the Company in the GCC) against all kinds of liabilities or damages, of whatsoever nature, including compensation arising from any accident to the person or property of those in Associate's employment or to any other person or properties including those of TPCODL, arising due to reasons attributable to any, act, omission or negligence of the Associate the Associates, for the entire period of contract including period of guarantee.

Within 7 days of award of work, the Associates shall submit Indemnity Bond in the format as per Annexure-E to Order Issuing Authority.

Contract having value more than Rs 2 Cr per Annum, Associates shall submit Indemnity Bond on Rs 100/- Non Judicial Stamp Paper in the format as per Annexure- E to Order Issuing Authority.

4.3 Display of Notice Boards at Work Sites

The Associate shall put up display notice board at each project site where the works are in progress indicating the information given below:

- Name of the Project.
- Estimated Cost of Project.
- Date of Commencement.
- Expected date of completion.
- Name of Associate and his telephone number.
- Name of Engineer-in-Charge and his telephone number.

4.4 Disposal of Waste at Site

Significant quantities of waste are generated during the execution of project and an integrated approach for effective handling, storage, transportation and disposal of the same shall be adopted. This would ensure the minimization of environmental and social impact in order to combat the climate change.

The associates shall follow the below criteria for disposal of waste at site during the execution of project.

- Associate shall ensure that the detailed project plan include the waste management, segregation of all designated waste material (Recyclable/ Non-Recyclable), collecting, storing, disposing and transferring the same to pre-arranged facility/destination in timely and safe manner as per environmental legislations during the execution of project. The project plan shall also include the innovative construction practice to eliminate or minimize waste, protect surface/ground water, control dust and other emissions to air and control noise during the execution of project. The copy of same shall be given to EIC before the commencement of project.
- The purchase policy of BA shall encourage the procurement of material with recycled and minimum packaging of goods during delivery. Associate shall provide the appropriate means for site to site transportation of materials to avoid damage and litter generation.
- Associate shall educate and inform to its project team about the requirement and responsibilities for waste minimization and disposal in general and provide training of practices that support this. Waste management should be treated like a safety program.
- In the event that area of contaminated or biological hazard is identified, Associate shall ensure that plant, equipment, personnel and any activity associated with the work is carried out in consultation with EIC of TPCODL.
- Associate shall ensure that the residents living near the site are kept informed about proposed working schedule and shall informed timings and duration of any abnormal noise full activity that is likely to happen.
- Associate shall ensure the regular maintenance and monitoring of vehicles and equipment for efficient fuel use so that emissions and noise are within acceptable limits to avoid air pollution.

4.5 Deployment of Work Force

Associate shall deploy adequate labour, as considered necessary by TPCODL for execution of the contract including Sundays and Holidays whenever required to do so with no extra cost to TPCODL. However, prior permission shall be taken from the site Engineer to carry out the work beyond normal working hours or on Sundays and Holidays. Female employees shall not be deployed beyond normal working hours/days and no child labour shall ever be deployed. Associate shall depute full time qualified and experienced engineers to supervise the work at site. All such staff shall be maintained from commencement to completion of all works to the entire satisfaction of the Engineer-in-Charge. Associate's employees deployed for the works under this contract will not be considered in Company's employment at any time. Associate shall continue to be responsible for all such employees, their safety, all types of statutory compliances related thereto and in any other manner whatsoever. The company will stand indemnified by the Associate in respect of all the above. At the same time Company upon noticing any breach or default on any statutory compliances, may at their sole discretion, decide to act in a manner as deemed fit at the risks and costs of the Associate.

TPCODL shall have the right to instruct the Associate to change the Sub- Associates or skilled /unskilled workers in case the conduct, the workmanship or speed of the work is not satisfactory.

Associates shall submit duly signed undertaking regarding engagement of competent staff / employee commensurate to the nature of job to Engineer–in–charge in the format attached as Annexure – H.

4.6 Damages to Properties

The Associates shall take necessary steps to ensure that the equipment and installations of the Company, Third parties, including other utility services like water supply pipelines; open drains telephone cables etc. are not damaged during execution of the works. The Associates shall be responsible for all such damages and shall have to repair/ replace and/or compensate for the entire claims in respect of such damages at its own cost.

4.7 Issuance of Material

The material issued to the Associate shall be in the custody of the Associates who shall be fully responsible for the same. After completion of the works, the Associates will reconcile the material. Any cost of material which is short or damaged/lost will be deducted from Associate bill/ deposits.

4.8 Company's Right To Use Works

If Taking Over Certificate is delayed for any reason, for which TPCODL's decision shall be final and binding upon the Associate, the Company shall be entitled to use the works or portion thereof without affecting Associate's responsibility and liability to complete the balance works as per company's directives from time to time, though Associate shall be afforded reasonable opportunity by the company to enable Associates to complete all balance works required for issuance of 'Taking Over Certificate' by the company.

4.9 Rights of TPCODL to vary the scope work

TPCODL shall have the right, during the performance of the Contract, to change the scope and/or technical character of the Project and/or of the supplies and services stipulated in the Contract by communicating the intent to do so in writing to the Associate. On receipt of such communication the Associate shall, within the time frame specified in the contract shall provide TPCODL with a reasonably detailed estimate of the cost of the change in scope outlined in the TPCODL communication. The change in the Contract price and time shall be revised upwards or downwards, as the case may be, and shall be mutually agreed to. The Associate shall not be entitled to any extension of time unless such changes adversely affect the time schedule.

The Associate shall not proceed with the changes in the scope of work till such time revision of Contract price and time schedule are approved and communicated to the associate by TPCODL.

Any change in the Scope of Work and/or Terms & Conditions of the order shall be intimated by TPCODL through an amendment to the contract. The amendment shall be treated valid only if signed by the authorized signatory of the original contract.

5.0 PRICES/ RATES/ TAXES

5.1 For Supply part of Contract

Unless specified elsewhere in the contract document, the prices/rates are inclusive of cost of finished product for which MDCC will be issued by TPCODL, packaging and forwarding charges, freight and transit insurance charges covering loading at Associate's works, transportation to TPCODL store/site & unloading & delivery at TPCODL stores/TPCODL site, cost of documentation including all the relevant test certificates and other supportive documents to be furnished.

The Prices/Rates are inclusive of all taxes, levies, cesses and duties, particularly Goods and Services Tax as applicable. All government levy / taxes shall be paid only when the invoice is submitted according to the relevant act.

The prices/rates shall remain firm till actual completion of entire supply of goods/material/equipment as per contract is achieved and shall remain valid till the completion of the contract.

The prices shall remain unchanged irrespective of TPCODL making changes in quantum in all or any of the schedules of items of contract.

5.2 For Service part of Contract

The Prices and Rates are inclusive of cost of materials supplied as per contract terms and for which MDCC is issued by TPCODL and to the extent required for completion of works, cost of service executed as per schedule of quantities, cost of testing as per contract terms, cost of documentations including all relevant test certificates and other supportive documents to be furnished as per contract terms. The rates shall remain firm till actual completion of contract.

The Prices/Rates are inclusive of all taxes, levies, cesses and duties, particularly Goods and Services Tax as applicable. All government levy / taxes shall be paid only when the invoice is submitted according to the relevant act.

The prices shall remain unchanged irrespective of TPCODL making changes in quantum in all or any of the schedules of items of contract.

5.3 Changes in Statutory Tax Structure

If rate of any or all of the statutory taxes and duties applicable to the contract changes, such changes shall be incorporated by default if the changes occur within the contract execution time and shall be applicable if the contract is executed by the Associate within the Contract Execution Time.

For execution of contracts beyond contract execution time, where the delay is not attributable to TPCODL no upward revision in tax /duties shall be considered irrespective of changes in the statutory tax structure either within the contract execution time or beyond. However, in such cases, benefits due to any downward revisions in statutory tax rates shall be passed on to TPCODL.

6.0 TERMS OF PAYMENT

A. 5% of the Release Order/ Purchase Order price shall be paid as initial interest free advance on fulfillment of the following by the Associate:

   a) Acceptance of PO/ LOI.
   b) Submission of advance payment BG of 15% of the Release Order/ Purchase Order price which shall remain valid till the advance is fully adjusted.

c) Submission of Contract Performance Bank Guarantee of 5/10% of the RC/ PO price valid till 30 days after taking over of the works.

B. 10% of the Release Order/ Purchase Order price shall be paid as interest free advance against approval of drawings under Category-1 of major drawings, Quality Plans, Pert Chart, Field Quality Plan, posting of Project Manager and commencement of the first mile stone of the work mutually agreed including C-3 Form, and submission of a true copy of 'Erection All Risk Insurance Policy' taken for the awarded jobs. The drawing list shall be mutually agreed at the time of award of work.

C. 50% on account payment of the total of item wise cost of material Release Order/ Purchase Order shall be paid against receipt of material at site in good condition and certification by TPCODL along with bills complete in all respects viz. MDCCs etc.

D. 20% on account payment of the actual executed value shall be paid against mechanical completion of erection on prorate basis against monthly bills and 70% on account of the actual executed value shall be paid against the service line item including composite line item. In case this milestone is not completed beyond 120 days for reasons attributable to TPCODL, the payment corresponding to supply part shall be released subject to submission of BG of equivalent amount by the BA valid for a period of further 12 months. If required, it shall be extended by the BA on request of TPCODL.

E. 15% payment of the actual executed Release Order/ Purchase Order shall be paid after completion of acceptance test and Taking Over of the complete systems specified in the enquiry, including clearance of Electrical Inspection, compliance of final punch point and after reconciliation & adjustment of payments, if any, towards Quantities of materials issued from purchaser's stock and consumed by the contractor for expeditious completion of the job. In case this milestone is not completed beyond 120 days beyond schedule for reasons attributable to TPCODL, the payment corresponding to supply part shall be released subject to submission of BG of equivalent amount by the BA valid for a period of further 12 months. If required, it shall be extended by the BA on request of TPCODL.

The Contractor shall submit all Operation & Maintenance manuals and "As Built Drawings" etc. and shall also submit Equipment Warranty Bank Guarantee (EWBG) equivalent to 5/10% of actual executed contract price before the release of this last payment and return of CPBG. The validity of EWBG shall be for a period of 15 months from the date of taking over of the works or specified guarantee period in drawing/tender/technical specification documents etc. whichever is later. The associate shall also submit 'No Demand Certificate' at the time of receipt of full and final payment.

6.1 Pre-Requisites for Payment

- Associate should have completed execution of that part of contract, for which payment is sought, to the satisfaction of TPCODL's Engineer-in-Charge responsible for the contract and obtained certification for execution of the work.
- Associate has undertaken joint measurement of the work executed along with TPCODL's Engineer-in-charge

- Associate's bills/invoices submitted have been certified by Engineer-In-Charge.

6.2 Bills & Invoices

Unless specified otherwise in the special conditions of contract, Associate shall raise not more than one invoice/contract per month for the services rendered in the prescribed Tax Format and the invoice shall be submitted within 15 days of the following month at Bill Inward Receipt Desk (BIRD) located at IDCO Towers, Janpath, Bubaneswar**.**

All Bills shall be supported by joint measurement of work done, quality test report and a copy of wage sheet, if applicable (showing proof of having disbursed wages as per applicable law) and a copy of statement substantiating that statutory payments having been affected.

Bills/ invoices shall mention Associate's 'Sales, Service, WCT Tax Registration Number, PAN number as applicable.

Final bill submission after completion of project or execution of job must be within 30 days from the actual date of completion/execution of work awarded.

6.3 Payment & Statutory Deductions

Payment shall be released within 30 days from the submission of the bills. The associate shall submit "No Demand Certificate" in the format as per Annexure-D at the time of receipt of full and final payment. In case any non-compliance to contract conditions comes to TPCODL's notice, TPCODL will be entitled to deduct 30% of estimated wages plus 20% of wages as TPCODL's overheads. Associates would be obliged to provide the copy of monthly wage sheet in any case, failing which no payment shall be made. TPCODL at their sole discretion may deposit the PF etc. with statutory authorities. TPCODL will deduct the amounts of TDS as per statutory requirement under the income tax act and the DVAT Act and certificates (wherever applicable) will be issued to associate accordingly.

In case of non-submission of PAN No TDS @ 20% shall be deducted from all payable amounts for which no TDS certificate shall be issued. TDS once deducted as above shall not be revised in any condition.

6.3.1 Statutory Deductions

TPCODL will deduct the amounts of TDS, TCS as per statutory requirement under the income tax act, the Goods and Services tax act, BOCW Act, or any other applicable tax act and certificates (wherever applicable) will be issued to associate accordingly. For consumption of TPCODL's Water and Electricity by Associate for execution of Contract, Associate shall pay 0.5% & 1.0% respectively of contract value and it shall be deducted from the running bills. The Engineer-in-Charge as stated in the Order shall be responsible for certification of the work executed and the bills. Bills (including original) shall be submitted in triplicate at Bill Inward Receipt Desk (BIRD) located at IDCO Towers, Janpath, Bhubaneswar.

6.4 Guidelines for Raising Running/Final Bills

Contract Value Up to 5 Lakhs	One Final Bill
Contract Value More than 5 lakhs	Monthly Running Bill & One Final Bill

All Bills shall be processed only when all bank Guarantees are in place and before payments of Final Bill Associate have to furnish NDC.

6.5 Quantity Variation

Payment will be made on the basis of actual quantity of supplies/actual measurement of works accepted by TPCODL and not on the basis of contract quantity.

6.6 Full and Final Payment

Full & Final Payment in all contracts shall be made subject to the associate submitting "No Demand Certificate" in the format as per Annexure-D.

7.0 MODE OF PAYMENT

Payment shall be made through RTGS mode for which Business Associated shall submit the details of Bank Account and other details as per annexure K. Further, for any payments made, TPCODL is not responsible for any consequences/disputes Associate have among the owners channel partners, sub-Associates and all such dispute/concerns shall be settled solely by the Associate.

The quantities of items indicated are estimated and preliminary. However, payments shall be made on the basis of actual quantity of work carried out and measured jointly by the Company and the Associate. Associates shall be responsible to organize joint measurements of works with TPCODL Engineer-in-Charge before raising any bill of work done. In the event Associate fails to do so, TPCODL at their sole discretion, may take measurements of work done and proceed as deemed fit and in such an event Associate's right to lodge any subsequent claim shall stand forfeited.

8.0 SECURITY CUM PERFORMANCE DEPOSIT

Associates shall submit within 15 days from the effective date of issue of PO/RC, Security cum Performance Guarantee (SPBG) in the format as per Annexure B of this document from banks acceptable to TPCODL for:

(a) 5% of the PO value if purchase order value is more than Rs 5 Crores.
(b) 10% of the PO value if purchase order value is less than Rs 5 Crores.
This shall remain valid till the end of the Guarantee Period of contract, plus one month.

(c) 5% of the RC value in case of Rate Contract. This shall remain valid till the Guarantee period plus one month.

- For PO/RC values less than Rs. 5 lacs, Associate may request for deduction of amount equivalent to SPBG value from their first invoice. Such amount shall be withheld by TPCODL while processing the invoice and shall be released after completion of Guarantee Period plus one month.
- For PO/RC values less than Rs. 3 lacs, the clause (8.0) for Security cum Performance Bank Guarantee (SPBG) shall not be applicable.
- In case of RC (Rate Contract) after the expiry of RC validity, Associate shall have to submit SPBG. However, the Associate has the option to re-submit the SPBG as per actual RO (Release Order) value issued against the RC, valid for Guarantee Period plus one month. The Guarantee Period shall be considered as per the last RO issued against the said RC. The original SPBG as submitted against the RC shall be released on submission of the new SPBG to TPCODL. Alternatively, Associate may extend the

validity of original SPBG only till the requisite period, i.e. Guarantee Period plus one month.

9.0 STATUTORY COMPLIANCE

9.1 Compliance to Various Acts

Associate should ensure adherence to all applicable laws, rules and regulation applicable under this contract from time to time. In case of violation any risk, costs etc shall be in associates account and keep TPCODL indemnified always till completion of contracts.

9.2 Social Accountability

TPCODL expects its Associates to follow guidelines of best practices on the following aspects

1. Child Labour
2. Forced or Compulsory Labour
3. Health & Safety
4. Freedom of Association & Right to Collective Bargaining
5. Discrimination
6. Disciplinary Practices
7. Working Hours
8. Remuneration
9. Management System

9.3 Affirmative Action

TPCODL appreciate and welcome the engagement/employment of persons from SC/ST community or any other deprived section of society by their business associates.

Relaxation in Contract Clauses under Affirmative Action for SC/ ST Business Associates**

TPCODL believes that inclusive growth is the key to sustainable development, and to promote the same Policy on Affirmative Action for Scheduled Caste & Scheduled Tribe Communities has been adopted across the company.

Under the same pre-text, and to promote entrepreneurship among SC/ST community TPCODL has taken initiative by proposing relaxations in contract clauses as per below:

S. No.	Initiative	for SC/ ST BA's	Guideline Document
1	Tender Fees	100% waiver for SC/ST community	All Open Tenders
2	Earnest Money Deposit	50 % relaxation of estimated EMD value	All limited and Open Tenders
3	Performance Bank Guarantee	25% relaxation in PBG for order value above 50 lacs else 50% relaxation	All limited and Open tenders
4	Turnover	25% relaxation in company turnover under qualifying requirement criteria	All Open Tenders

****Classification of BAs under SC/ST shall be governed under following guidelines:**

- Proprietorship/ Single Ownership Firm: Proprietor of the firm should be from SC/ST community. Governing document shall be duly audited balance Sheet for the last FY bearing the name of proprietor.
- Partnership Firm: Only such firms shall qualify which have SC/ST partners holding equal to or more than 50% of the total ownership pattern of the firm. Governing document shall be Partnership Deed and audited balance sheet/ ITR for last FY.
- Private limited company: Only such firms shall qualify which have SC/ST directors holding equal to or more than 50% of the total ownership pattern of the firm. Governing document shall be Memorandum of Understanding (MoU) and/or Article of Association (AoA).

Certification from SC/ST commission shall be required for deciding upon SC/ST status of a person.

9.4 Compliance to Labour Laws

Bidder needs to ensure compliance to applicable labour laws including timely disbursement of wages. In case wages are not disbursed as per the stipulated timelines, then TPCODL shall pay the wages to BA employees on behalf of BA. Apart from deducting the amount of wages paid, TPCODL shall deduct an additional service charge equivalent to 25% of the wages paid from the payment due to BA.

9.5 Compliance to Construction and Demolition Waste Management Rules & Environment (Protection) Amendment Rules

BA is liable to follow the Construction and Demolition Waste Management Rules- 2016, Environment (Protection) Amendment Rules- 2018 and Guidelines on dust mitigation measures in handling construction material and C&D wastes issued by CPCB.

Following are some main points of above Rules/Guidelines for Construction work, cable laying jobs etc.

1. Barricading to be provided at site to cover complete area.
2. Construction material and waste should be inside the closed area made by using barricading.
3. Water sprinkling/fine spray from nozzles to be done to suppress the dust.
4. The board of Dust mitigation measures shall be displayed at site for public viewing with required details.
5. Loose sand or soil and construction material that causes dust shall be covered.
6. Transport material that are easily wind borne need to be covered by a sheet made of either jute, tarpaulin, plastic or any other effective material.
7. All areas for storing C&D waste/construction material to be demarcated and preferably barricaded particularly those materials that have potential to be dust borne.
8. Grinding and cutting of building materials in open area shall be prohibited.
9. Construction material and waste should be stored only within earmarked area and road side storage of construction material and waste shall be prohibited.
10. No uncovered vehicles carrying construction material and waste shall be permitted.
11. Construction and demolition waste processing and disposal site shall be identified and required dust mitigation measures to be notified at the site.

10.0 QUALITY

10.1 Knowledge of Requirements

The Associate shall be deemed to have carefully examined and to have knowledge of the equipment, the general and other conditions, specifications, schedules, drawings, etc. forming part of the Contract and also to have satisfied himself as to the nature and character of the work to be executed and the type of the equipment and duties required including wherever necessary of the site conditions and relevant matters and details. Any information thus procured or otherwise obtained from TPCODL/Consultants shall not in any way relieve the Associate from his responsibility and executing the works in accordance with the terms of contract.

10.2 Material/Equipment/Works Quality

The items / works under the scope of the Associate shall be of the best quality and workmanship according to the latest engineering practice and shall be manufactured from materials of best quality considering strength and durability for their best performance and, in any case, in accordance with the specifications set forth in this Contract. All material shall be new. Substitution of specified material or variation from the process of fabrication/construction/manufacture may be permitted but only with the prior written approval of the TPCODL.

10.3 Adherence to Rules & Regulations

The Associate shall procure and/or fabricate/erect all materials and equipment in accordance with all requirements of Central and State enactment, rules and regulations governing such work in India and at site. This shall not be construed as relieving the Associate from complying with any requirement of TPCODL as enumerated in the Contract which may be more rigid than and not contrary to the above mentioned rules, nor providing such construction as may be required by the above mentioned rules and regulations. In case of variance of the Technical Specification from the laws, ordinance, rules and regulations governing the work, the Associate shall immediately notify the same to the TPCODL. It is the sole responsibility of the Associate, however, to determine that such variance exists. Wherever required by rules and regulations, the Associate shall also obtain the statutory authorities' approval for the plant, machinery and equipment to be supplied by the Associate.

10.4 Specifications and Standards

The Associate shall follow all codes and standards referred in the Contract Document. Codes and standards of other may be followed by the Associate with the prior written approval of TPCODL, provided materials, supplies and equipment according to the standard are equal to or better than the corresponding standards specified in the Contract.

Brand names mentioned in the Contract documents are for the purpose of establishing the type and quality of products to be used. The Associate shall not change the brand name and qualities of the bought out items without the prior written approval of the TPCODL. All such products and equipment shall be used or installed in strict accordance with original manufacturer's recommendations, unless otherwise directed by the TPCODL. In any

circumstances the codes, specimen and standards prescribed by any government agency should not be violated.

11.0 SAFETY

All Associates shall strictly abide by the guidelines provided in TPCODL's Contractor Safety Management System (CSMS) as applicable at all stages during the contract period. Associate shall execute the contracts ensuring the following in and as order of priority:

- Safety of Human Beings.
- Safety of equipment/Assets.
- Timely Completion of Contract.

Safety related requirements as mentioned in our Contractor Safety Management System is attached as annexure L and is an integral part of this GCC.

12.0 INSPECTION/PARTICIPATION

12.1 Right to Carry Out Inspection

TPCODL reserves the right to send its representatives for inspection or participation at various stages of contract execution listed below, applicable as per contract construction.

- During basic design and detail engineering of material/ Equipment carried out by Associate /Outsourced Agencies.
- During manufacturing stages of the product at Associate's/Associate's Outsourced Agency's Plant/Facility.
- During Pre-dispatch Inspection and Testing of finished/manufactured product at Associate's/Associate's outsourced Agency's Plant/Facility.
- During Installation & Commissioning Activities/Stages.
- Prior to Clearing of the completed installation for commissioning.
- Any other stage as find appropriate by TPCODL during contract execution time.

All inspections and participations shall be carried out within maximum of two weeks of TPCODL giving written intimation to the Associate or receiving appropriate advance written inspection call from the Associate, unless otherwise specified elsewhere in the contract document.

12.2 Facilitating Inspection

The Associate shall provide all opportunities and information to TPCODL's engineers to get acquainted with the technical know-how and the methods and practices adopted by the Associate in basic and detail engineering. The Associate shall provide documents, drawings, calculations etc. as may be required by TPCODL's Engineers.

The Associate shall provide free of charge office accommodation, office facilities, secretarial services, communication facilities, general and drawing office stationary, etc. as may be reasonably required by the TPCODL's engineers. Similarly, facilities shall also be provided by Associate's outsource agencies/partners/authorized dealers (collectively termed as sub-associates) if such basic and detail engineering activities are carried out in the design offices of sub-Associates.

The Associate shall be responsible for the safety of employees of TPCODL/Third Party Agency when they are at the Associate's /Associate's outsource agency's plant or facility for carrying out/witnessing inspection/testing. All statutory safety precautions as applicable shall be followed by the Associate during Inspection Testing. If TPCODL inspectors are not satisfied with the safety arrangements at the plant, TPCODL have the right to call off inspection till such time corrective action is taken by the Associate.

Before raising the call for pre-dispatch final inspection and testing, the Associate shall conduct all the tests—type tests, routine tests etc-as specified in the contract document and submit copies of the test certificates to TPCODL along with the inspection call, for scrutiny of TPCODL.

The Associate and TPCODL shall jointly document all the observations, comments and action points after completion of inspection and it shall be binding on the Associate to provide compliance on all the points requiring compliance and furnish the compliance report to the designated authority of TPCODL for receiving clearance for dispatch of materials.

12.3 Third Party Nomination

TPCODL also may nominate a third party for the purpose of carrying out the inspection and such an agency shall be entitled to all the rights and privileges of TPCODL as far as conducting the inspection.

12.4 Waiver of Inspections

TPCODL on its own discretion shall chose to waive off any inspection and ask the Associate to submit all the test reports as applicable as per contract specifications, related to inspection and testing of the goods ordered for scrutiny and clearance for dispatch.

12.5 Incorrect Inspection Call

In case it is observed that the material offered for inspection is not ready at the time of TPCODL inspection visit rendering it as futile, all costs towards such inspection shall be recovered from the BA. Taxes as applicable on such recoveries shall be borne by the BA.

13.0 MDCC & DELIVERY OF MATERIALS

13.1 Material Dispatch Clearance Certificate

Associate shall deliver material/goods/equipment against Supply Contracts or Supply Part of Composite/Service Contracts only after receiving Material Dispatch Clearance Certificate (hereafter termed as MDCC) issued by designated authority of TPCODL. Material delivered at TPCODL stores or at project site without a valid MDCC issued by the designated official of TPCODL shall be rejected. MDCC shall be issued to associate furnishing compliance report on the action points documented during pre-dispatch inspection and testing at Associate's/ Sub-Associate's plant/ facility. In case Pre-dispatch inspection is waived at the discretion of TPCODL, then, MDCC shall be issued on receiving all the test reports-routine& type-from the Associate and finding them in order.

The associate shall include and provide for securely protecting and packing the materials so as to avoid loss or damage during handling and transport by air, sea, rail and road or any other means.

All such packing shall allow to the extent possible for easy removal and checking at Site. The associate shall take special precautions to prevent rusting of steel and iron parts during

transit by sea. Gas seals or other materials shall be utilised by the associate for protection against moisture during transit of all Plant and Equipment.

Each Equipment or parts of Equipment shall be tagged with reference to the assembly drawings and corresponding part numbers. Each bale or package shall contain a packing note quoting specifically the name of the associate, item description, quantity, item / package identification.

All packing cases, containers, packing and other similar materials shall be new and supplied free by the associate and it shall not be required to be returned to the associate.

Notwithstanding anything stated in this clause, the associate shall be entirely responsible for loss, damage or depreciation or deterioration to the materials and supplies due to faulty and/or insecure packing or otherwise during transportation to the Site until otherwise provided herein.

In case of the consignments dispatched by road, the associate shall ensure that it or its sub-contractors:

i) Identify and obtain the correct type of trucks/trailers, keeping in view the nature of consignments to be dispatched.

ii) Take such actions as may be necessary to avoid all possible chances of damages during transit and to ensure that all packages are firmly secured.

Timelines for inspection and MDCC is as below:

S. No.	Inspection	MDCC issuance time including inspection time (max.)
1	Outside Bhubaneswar	12 days
2	Within Bhubaneswar	5 days
3	Waiver*	3 working days

* Associate is expected to raise the inspection call assuming that Inspection shall be carried out by TPCODL. The decision for waiver of inspection shall be on sole discretion of TPCODL.

13.2 Right to Rejection on Receipt

Goods/Material/Equipment delivered in condition physically damaged & incomplete as a product ordered, or not packed and transported as per the terms and conditions of the contract is liable to be rejected. Such item shall be lifted back by Associates within 15 days from receipt of rejection note from TPCODL and have to supply back the material within next 30 days or within the timeframe mutually decided by Associate and TPCODL.

If delivery of the material is beyond the agreed time, Liquidated damage clause, mentioned in this GCC separately shall be applicable; but the period for levy of LD shall be considered as per the original delivery schedule and not from the agreed timelines for material rectification.

13.3 Consignee

Unless otherwise specified in the Contract Document, Materials/Goods/Equipment shall be consigned to “Stores-In-Charge”, TPCODL Bhubaneswar.

13.4 Submission of mandatory documents on Delivery

Following documents shall be mandatorily submitted by BA along with supply of material to TPCODL stores/site:

S. No.	Documents	Requisite
1	Invoice copy in original	With all consignments
2	LR copy	Wherever required
3	Packing list	With all consignments
4	MDCC	With all consignments
5	Purchase order / Release order	Signed copy
6	Test certificates	With all consignments
7	Inspection/JVR report	In case pre-dispatch inspection is conducted
8	Device data in CD as per template for metering items	Wherever applicable

13.5 Dispatch and Delivery Instructions

S. No.	Instructions
1	Purchase order/ Release order no. shall be mentioned on invoice and on material
2	TPCODL material code and material description shall be mentioned in invoice and on material.
3	“Property of TPCODL” shall be embossed on material.
4	The material shall be properly sealed and packed in standard packing as per purchase order terms & conditions.
5	The weight and quantity of material shall be mentioned wherever applicable
6	The material supplied shall be co-related with the packing list.
7	The name plate detail on equipment shall include Material code, Material description, specification detail of material [as applicable], Serial No. Year of manufacturing, PO/RO no. and date, “PROPERTY OF TPCODL, Bhubaneswar”, Guarantee period and Associate’s name.
8	In case of manual unloading, supplier / transporter shall deploy sufficient Labour for unloading the material at TPCODL central store. For heavy item(s), crane will be provided by TPCODL [unloading cost will be recovered from the associate].
9	The driver should have valid License and one helper in truck. All the documents of truck like registration papers, PUC etc. should be available in Truck.
10	BA representative should accompany the material and get it unloaded / stacked in his presence wherever possible.

14.0 GUARANTEE

14.1 Guarantee of Performance

Associates shall stand guarantee that the equipment and material supplied/service or work rendered under the contract is free from design, manufacturing, material, construction, erection & installation and workmanship & quality defects and is capable of its due, rated and intended quality performance, as an integrated product delivered under the contract. for a specific period termed as Guarantee Period(as elaborated elsewhere in this clause) The

Associate should also guarantee that the equipment/material is new and unused except for the usage required for the tests and checks required as part of quality assurance.

14.2 Guarantee Period

The Guarantee Period will be equipment/service/work specific and shall be as specified in the Standard Specifications of TPCODL for the equipment/material/service/work and where standard specifications are not part of contract documents or guarantee period is not specified in the standard specifications,, the guarantee period shall be as per the Special Terms and Conditions of the Contract. In case of no mention of the guarantee period in standard specifications or SCC, Guarantee Period will be 15 Months from the Date of Commissioning or 24 months from the date of delivery of final lot of supplies made, whichever is earlier.

14.3 Failure in Guarantee Period (GP)

If the equipment and material supplied/service or work rendered under the contract fails to perform its due, rated & intended quality performance, during the Guarantee period, the associate is liable to undertake repair/rectify/replace the equipment and material supplied/service or work rendered under the contract within time frame specified in the SCC or elsewhere in the contract documents at associate's cost to make the equipment and material supplied/service or work rendered under the contract of performing its due, rated and intended quality performance. If Associate fails to repair/rectify/replace the equipment or material supplied/service or work rendered under the contract, failed in Guarantee Period, TPCODL will be at liberty to get the same done at Associate's risks and costs and recover all such expenses plus the TPCODL's own charges (@ 20% of expenses incurred), from the Associate or from the "Security cum Performance Deposit" as the case may be.

If during the Warranty/ Guarantee period some parts of the supplies are replaced owing to the defects/ damages under the Warranty, the Warranty period for such replaced parts shall be until the expiry of twelve months from the date of such replacement or renewal or until the end of original Guarantee period, whichever is later.

Any repairs during the Guarantee Period shall be carried out by the Associate within 30 days of reporting the issue to Associate by TPCODL. However, if replacement of the Equipment is required, Associate shall notify the same to TPCODL within 7 days of reporting the issue by TPCODL. Thereafter, the total time for supply of new equipment/ material shall be equal to the original delivery period of that equipment/ material as specified in the Contract. In case the Associate is not able to rectify/ replace the faulty equipment/ material within the stipulated timelines as mentioned above, penalty shall be levied as per the Liquidated Damages clause mentioned in this document. The penalty amount shall be recovered from the payment due to the vendor or by encashment of the SPBG as the case may be.

14.4 Cost of repairs on failure in GP

The cost of repairs/rectification /replacement, apart from the actual cost of repairs/rectification/replacement is also inclusive of all associate costs of required transportation, site inspection /mobilization/dismantling and re-installation costs as applicable, to be borne by the Associate. The Associate has to ensure that the interruption in the usage of intended purpose of the equipment is minimized to the maximum extent In lieu of the time taken for repairs/rectification/replacement.

14.5 Guarantee period for Goods Outsourced

If the Associate outsources partly equipment/materials/services from third party as mutually agreed upon at the pre award stage of contract, TPCODL shall have the benefit of any additional guarantee period if provided by the third party for the part supplied/executed by them.

14.6 Latent Defect

Hidden defects in manufacturing or design of the product supplied and which could not be identified by the tests conducted but later manifested during operation of the equipment are termed as latent defects. Associates shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Company.

14.7 Support beyond the Guarantee Period

The Associate shall ensure availability of spares and necessary support for a period of at least 10 years post completion of guarantee period of equipment supplied against the contract.

15.0 LIQUIDATED DAMAGES

Liquidated damages @1% of the total executed contract value per week or part thereof, for the period of delay in integrated completion, subject to maximum 10% of the value of the contract shall become leviable without prejudice to other rights of the TPCODL. This amount shall be recoverable from any amount due or becoming due to the Business Associates under this or any other contract. In specific cases, TPCODL reserves the right to apply LD only on the unexecuted portion of the supply and works for standalone use, provided full quantity is executed within a maximum 30% additional time. Deduction of LD shall be on landed cost i.e contract value inclusive of taxes and in pursuant statutory compliance GST would be applicable at the stipulated rate and the same shall be borne by Business Associate. In case of LD deduction, a GST invoice shall be issued by TPCODL as a proof of deduction/ recovery.

15.1 LD Waiver Request

Any request of LD waiver shall be submitted within thirty (30) days of deducting LD. Request submitted beyond the timeline shall not be entertained.

15.2 Material Recovery

In case of any recoveries for materials or services (for material free issued by TPCODL and not reconciled by BA or for services claimed and paid in excess at the time of running bills), the total cost which shall be recovered from the BA, shall be the gross amount of material or services (i.e. including taxes) plus applicable taxes as prevailing at the time of such recoveries.

16.0 ASSIGNMENT OR SUBCONTRACTING

Associates shall not assign/subcontract/outsource the schedule of activities of contract TPCODL enters with the associate, in part or full, without TPCODL's prior written approval.

However outsourcing of materials/equipment/services by Associate to make the integrated product for which TPCODL's has placed the contract with the associate from suppliers, makes and agencies which have been mutually agreed upon during contract pre-award stage is permitted subject to following conditions.

In such cases where outsourcing is done by the Associate

- Shall ensure that outsourced suppliers comply with the technical and financial qualification requirements specified by TPCODL in the contract document
- Shall furnish all particulars about the proposed outsourcing agencies and the details of the goods/services/work outsourced to the Associate while seeking approval of TPCODL for inclusion for outsourcing. The Associate shall give approval or shall refuse approval in writing within thirty (30) days of receipt of such request. However the Associate shall not be entitled for any additional contract execution time whatsoever in lieu of the process for approval for outsourcing agencies, and shall be held responsible for any delay in the project execution time.
- Shall remain jointly and severally liable for any action, deficiency, and/or negligence on the part of his outsourcing agencies. The approval extended by the Associate to outsourcing agencies recommended by the Associate shall not discharge the later from his Contract obligations.

Shall submit to the Associate unpriced copies of purchase orders with technical specifications included in the orders, placed on outsourcing agencies as soon as the respective orders have been placed by the Associate.

17.0 UNLAWFUL ACTIVITIES

The Associate shall have to ensure that none of its employees are engaged in any unlawful activities (whether covered under the scope of the present GCC or not) subversive of the TPCODL's interest failing which appropriate action (legal or otherwise) may be taken against the Associate by the TPCODL, in accordance with the terms of the present GCC.

18.0 CONFIDENTIALITY

Associate and its employees or representatives thereof shall strictly maintain the confidentiality of various information they come across while executing the contract as detailed below.

18.1 Documents

All maps, plans, drawings, specifications, schemes and other documents or information related to the Contract/Project and the subject matter contained therein and all other information given to the Associate by the TPCODL in connection with the performance of the contract shall be held confidential by the Associate and shall remain the property of the TPCODL and shall not be used or disclosed to third parties by the Associate for any purpose other than for which they have been supplied or prepared. The Associate may disclose to third parties, upon execution of confidentiality agreements, such part of the drawings, specifications or information if such disclosure is necessary for the performance of the Work provided such third parties agree in writing to keep such information confidential to the same extent and degree as provided herein, for the benefit of the TPCODL.

18.2 Geographical Data

Maps, layouts and photographs of the unit/plant including its surrounding regions showing vital installation for national security of country or those of TPCODL shall not be published or disclosed to the third parties or taken out of the country without prior written approval of the TPCODL and upon execution of confidentiality agreements satisfactory to the TPCODL with such third parties prior to disclosure.

18.3 Associate's Processes

Title to secret processes if any developed by the Associate on an exclusive basis and employed in the design of the equipment shall remain with the Associate. TPCODL shall hold in confidence such processes and shall not disclose such processes to the third parties without prior approval of the Associate and execution by such third parties of secrecy agreements satisfactory to the Associate prior to disclosure. Upon completion of contract, such processes shall become the property of the TPCODL. Title to technical specifications, drawings, flow sheets, norms, calculations, diagrams, interpretations of test results, schematics, layouts and such other information, which the Associate has supplied to the TPCODL under the Contract shall be passed on to the TPCODL. The TPCODL shall have the right to use these for construction, erection, start-up, Trial Run, operation, maintenance, modifications and/or expansion of the works including for the manufacture of spare parts.

18.4 Exclusions

The provision of Clauses 16.1 to 16.3 shall not apply to information:

- Which at the time of disclosure are in the public domain which later on become part of public domain through no fault of the party concerned, or
- Which were in the possession of the party concerned prior to disclosure to him by the other party, or
- Which were received by the party concerned after the time of disclosure without restriction on disclosure or use, from a third party who did not acquire such information directly or indirectly from the other party or has no obligation of confidentiality for such information.

18.5 Violation

In case of violation of this clause, the Associate is liable to pay compensation and damages as may be determined by the competent authority of TPCODL.

19.0 INTELLECTUAL PROPERTY RIGHTS

If, in the course of performance of its functions and duties as envisaged by the scope of the present GCC, the Associate acquires or develops, any unique knowledge or information which would be covered, or, is likely to be covered within the definition of a trademark, copyright, patent, business secret, geographical indication or any other form of intellectual property right, it shall be obliged, under the terms of this present GCC, to share such knowledge or information with the TPCODL. All rights, with respect to, or arising from such intellectual property, as afore mentioned, shall solely vest in TPCODL.

Moreover, the Associate undertakes not to breach any intellectual property right vesting in a third party/parties, whether by breach of statutory provision, passing off, or otherwise. In the event of any such breach, the Associate shall be wholly liable to compensate, indemnify or make good any loss suffered by such third party/parties, or any compensation/damages

arising from any legal proceeding/s, or otherwise. No liability of TPCODL shall arise in this respect, and any costs, damages, expenses, compensation payable by TPCODL in this regard to a third party/parties, arising from a legal proceeding/s or otherwise, shall be recoverable from the Associate.

20.0 INDEMNITY

The Associate shall at all times indemnify, keep indemnified and hold harmless the TPCODL and its officers, directors, employees, affiliates, agents, successors and assigns against all actions, claims, demands, costs, charges and expenses arising from or incurred by reason of any infringement of patent, trade mark, registered design, copy rights and/or industrial property rights by manufacture, sale or use of the equipment supplied by the Associate whether or not the TPCODL is held liable for by any court judgement. In this connection, the TPCODL shall pass on all claims made against him to the Associate for settlement.

The Associate assumes responsibility for and shall indemnify and save harmless the TPCODL from all liability, claims, costs, expenses, taxes and assessments including penalties, punitive damages, attorney's fees and court costs which are or may be required to be paid by the TPCODL and its officers, directors, employees, affiliates, agents, successors and assigns arising from any breach of the Associate's obligations under the Contract or for which the Associate has assumed responsibilities under the Contract including those imposed under any local or national law or laws, or in respect to all salaries, wages or other compensation for all persons employed by the Associate or his Sub-Associates or suppliers in connection with the performance of any work covered by the Contract. The Associate shall execute, deliver and shall cause his Sub-Associate and suppliers to execute and deliver, such other further instruments and to comply with all the requirements of such laws and regulation as may be necessary there under to conform and effectuate the Contract and to protect the TPCODL.

The TPCODL shall not be held responsible for any accident or damages incurred or claims arising, due to the Associate's error there from prior to completion of work. The Associate shall be liable for such accidents and after completion of work for such accidents as the case may be due to negligence on his part to carry out Work in accordance with Indian laws and regulations and the specifications set forth herein.

21.0 LIABILITY & LIMITATIONS

21.1 Liability

Except for any specific liability which may be identified in the Contract and which may be payable hereunder, Associate shall not be liable for any special, incidental, indirect, or consequential Damages or any loss of business Contracts, revenues or other financial loss (or equivalents thereof no matter how claimed, computed or characterized) arising out of or in connection with the Performance of the Work or supply of Goods ***unless caused by Associate's negligence, willful misconduct or breach of contract.***

TPCODL shall have no liability or any special, incidental, indirect or consequential Damages for any loss of Business Contracts, revenues or other financial loss arising out of this Contract.

21.2 Limitation of Liability

The total liability of Associate against any contract shall be limited to the Total All Inclusive Contract Value.

22.0 FORCE MAJEURE

Force Majeure applies if the performance by either Party ("the Affected Party") of its obligations under Contract is materially and adversely affected.

“Force Majeure” shall mean any event or circumstance or combination of events or circumstances referred below and their consequences that wholly or partly prevents or unavoidably delays any Party in the performance of its obligations under this Agreement, but only and to the extent that such events and circumstances are not within the reasonable control, directly or indirectly, of the Affected Party and could not have been avoided even if the Affected Party had taken reasonable care:

- Act of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, embargo, blockade, revolution, riot, bombs, religious strife or civil commotion, etc.
- Politically motivated sabotage, or terrorism, etc.
- Action or Act of Government or Governmental agency for which remedy is beyond the control of the affected parties.
- Any act of God.

Note: Causes like power breakdown/ shortages/fire/strikes, accidents etc do not fall under Force Majeure.

Time being the essence of the Contract, if either party is prevented from the performance of its obligations in whole or in part due to an event of Force Majeure, then provided Notice of happening of any event by the Affected Party is given to the other party within seven (7) days from the date of occurrence of such event, which DIRECTLY has impact on works and submitted details and quantum of resulting effect, but at the same time had made all possible efforts to mitigate and overcome effects thereof, the Affected Party’s performance under this Contract shall be suspended until such event ceases and the Scheduled Completion shall be delayed accordingly.

If Force Majeure event(s) continue for a period of more than three months, the parties shall hold consultation to discuss the further course of action.

Neither party shall be considered to be in default or in breach of its obligation under the Contract to the extent that performance of such obligation by either party is prevented by any circumstances of Force Majeure which arise after effective date of Contract.

Neither party can claim any compensation from the other party on account of Force Majeure.

23.0 SUSPENSION Of CONTRACT

23.1 Suspension for Convenience

TPCODL may, at any time and at its sole option, suspend execution of all or any portions of the schedule of items of contract to be supplied/work to executed by Associate under the contract by providing to the Associate at least two business days written notice for contracts having contract completion period less than sixty days and at least seven business days’ notice for all other contracts.

Upon receipt of any such notice, the Associate shall respond as follows as applicable as per contract construction.

- Immediately discontinue further supply of material/goods specified in the suspension notice for supply contracts
- Immediately discontinue further service/work and supply of materials of those services/materials/work specified in the suspension notice for service /composite contract
- Promptly make every reasonable effort to obtain suspension, upon terms satisfactory to TPCODL, of all orders, outsourcing arrangements, and rental Contracts to the extent that they relate to performance of the portion of Work suspended by the notice.
- Protect and maintain the portion of the service/Work already completed, including the portion of the Work suspended hereunder, unless otherwise specifically stated in the notice.
- Continue delivering/carrying out the supply/service/work items as per contract conditions, which do not fall under purview of the suspension notice.

On receipt of resumption notice from TPCODL, the Associate shall resume execution of contract as specified in the resumption notice, within the time frame specified in the resumption notice,

23.2 Suspension for Breach of Contract conditions.

TPCODL shall suspend execution of whole/or part thereof the contract till such time Associate complies with the conditions stipulated under section clause 27 for breach/default of contract conditions.

23.3 Compensation in lieu of Suspension

If the suspension of the contract in whole or in part is for convenience of TPCODL and not due to any breach of contract conditions by the associate, TPCODL at its discretion shall consider compensating all reasonable additional costs incurred by Associate in lieu of suspension of whole or part of contract, on representation of the Associate providing justified estimates of such additional costs and such estimates are found acceptable and approved by competent authority of TPCODL.

If the suspension of contract in whole or part thereof is due to breach of contract conditions (refer clause 24.3) by the Associate, Associate shall not be entitled for any compensation for any cost incurred in lieu of suspension of whole or part of contract and also shall be liable for compensating all the losses arising to TPCODL in lieu of suspension of contract. Resumption notice shall be subject to the Associate taking corrective action for the breach of contract conditions within the time frame and as per the terms specified in the suspension notice.

24 TERMINATION OF CONTRACTS

24.1 Termination for Default/Breach of Contract

The contract / PO shall be subject to termination by TPCODL in case of breach of the contract by the Associate which shall include but not be limited to the following:

a. Withdrawal or intimation by the Associate of its intent to withdraw or surrender the execution / completion of the contracted work /PO or failure in ensuring adherence to any delivery schedules, in deviation of the contract/ PO.

b. Refusal or neglect on the part of the Associate to supply material/equipment of quantity or quality as specified by TPCODL and within the timeframe as specified in the contract document or refusal or neglect to execute the services/work in terms of the agreed standards of quantity or quality and/or within the timeframe specified in the contract/PO.

c. Failure in any respect to perform any portion of the Work contracted with promptness, diligence, or in accordance with the terms of the contract.

d. Failure to furnish guarantees as specified and /or failure to comply with the terms thereof.

e. Failure to furnish such relevant documents or information within the time specified which may be necessary for due execution / completion of the works and documentation.

f. Liquidation, bankruptcy either voluntary or involuntary OR entering into any composition or compromise with its creditors, or Insolvency.

g. In case any reasonable information has been received by TPCODL that Associate has adopted/ or attempted to adopt any unethical conduct, action in award of the contract /PO or at any time thereafter.

h. Failure to comply with applicable statutory provisions as contained in the contract or failure to comply with the applicable laws.

i. Failure to comply with safety regulations/clauses stipulated in the contract or as may be generally instructed by TPCODL.

If the default or breach as specified under clause 24 (except sub clause g thereof) be committed by the associate for the first time, TPCODL shall issue, along the with notice of default or breach, a warning notice instructing the associate to take remedial/corrective action within the time frame stipulated in the warning notice and not to repeat the same in future. The timeframe for corrective action by the associate shall be specific to the nature of breach of contract and the same shall not be objected to by the Associate. If the Associate fails to comply with the instructions in the warning notice or in taking corrective action to the satisfaction of TPCODL then TPCODL may terminate the entire or part of contract at its discretion by issuing termination notice without incurring any liability on this ground.

In case the contract is terminated for any breach of the nature specified in clause 24 g stated above, TPCODL shall have the right to terminate all the contracts TPCODL is having with the Associate by issuing termination notice which shall be without prejudice to the other rights of TPCODL available to it under law.

Without prejudice to its right to terminate for breach of contract, TPCODL may, without assigning any reason, terminate the Contract in whole or in part at any time at its discretion while the contract is in force by serving a written notice of two weeks to the Associate.

In the event of TPCODL having proceeded with termination of the contract the associate shall comply and proceed further in the following manner:

i) Associate shall discontinue the supply, on the expiry of the said period of two weeks.

ii) Associate shall ensure that no further steps are being taken towards discharge of the obligations, terms and conditions as contained in the contract/PO. This shall include initiation of actions not limited to discontinuation of other allied and associated arrangements which the associate might have entered into with third parties for due discharge of its obligations under the contract with TPCODL.

iii) The Associate shall perform thereafter such tasks as may be necessary to preserve and protect the terminated portion of the material/service/work in progress and the materials and equipment at TPCODL sites or in transit thereto. However the associate shall continue to fulfill its contractual obligations with regard to the part of contract not terminated.

iv) It shall be open for TPCODL to conduct a joint assessment with the associate of the material ,supplies, equipment ,works or in general as to the subject matter of the contract in regard to which the associate claims having completed its obligations before or during such termination.

v) It shall be open to TPCODL to seek invocation of the performance bank guarantee or any other guarantee or other security deposit by whatever name called submitted by the associate, which shall not be objected to or protested against by the associate.

In case of termination of the contract the parties agree to be governed inter alia by the following:

a) In case TPCODL exercises its right of termination as stated above the associate shall not dispute or object to the same.

b) The Associate shall be entitled to receive and claim only such payments OR sums of money from TPCODL as may be found payable to it in regard to works executed by it under the terms of the contract and no other claim of any nature whatsoever shall be made by the Associate.

c) All such provisions which the parties have agreed to survive and prevail even after termination of the contract shall remain effective despite the termination.

In the event of such termination, TPCODL may finish the Work by whatever method it may deem expedient, including the hiring of services and /or purchase of material equipment from such third parties as TPCODL may deem fit or may itself provide any labor or materials and perform any part of the Work. The associate undertakes to bear the incremental costs if any paid by TPCODL in such a case attributable to failure on the part of the associate. The Associate in such a case shall not be entitled to receive any further payments and any sums found payable to it may be adjusted by TPCODL against the amount recoverable from him on this ground. The same shall be without prejudice to other rights available to TPCODL under law against the associate.

Upon the termination of any of the contract due to occurrence of any circumstances provided in clauses stated above and constituting repeated breach or misconduct , TPCODL shall be entitled to bar the associates its agents , affiliates from undertaking any negotiation / tendering, bidding, participation activities concerning TPCODL for a period of two years from date of such termination. The same shall be without prejudice to other rights available to TPCODL.

24.2 Termination for convenience of Associate

Associate at its convenience may request for termination of contract, clearly assigning the reason for such request. TPCODL has full right to accept, reject or partially accept such request. This convenience will be available to associate only after one year from the contract effective date. For this purpose, associate will provide a notice period of 90 days to TPCODL, Associate will have to pay TPCODL a 'termination convenience fee' equivalent to 5% of unexecuted contract value.

24.3 Termination for Convenience of TPCODL

TPCODL at its sole discretion may terminate the contract by giving 30 days prior notice in writing or through email to the Associate. TPCODL shall pay the Associate for all the supplies/ services rendered till the actual date of contract termination against submission of invoice by the Associate to that effect**.**

25.0 DISPUTE RESOLUTION & ARBITRATION

In case of any dispute or difference the parties shall endeavor to resolve the same through conciliatory and amicable measures within 15 Days failing which the matter may be referred by either party for resolution by the sole arbitrator to be appointed mutually by both the parties. The arbitral proceedings shall be conducted in accordance with Arbitration and Conciliation Act 1996 and the place of arbitration shall be Bhubaneswar. The language to be used at proceedings shall be English and the award of the arbitrator shall be final and binding on the parties. The parties shall bear their respective costs of arbitration. The associate shall continue to discharge its obligations towards due performance of the works as per the terms of the contract during the arbitration proceedings unless otherwise directed in writing by TPCODL or suspended by the arbitrator. Further, TPCODL shall continue making such payments as may be found due and payable to the associate for such works.

25.1 Governing law and jurisdiction

The parties shall be subject to the jurisdiction of the courts of law in Bhubaneswar and any matter arising here from shall be subject to applicable law in force in India.

26.0 ATTRIBUTES OF GCC

26.1 Cancellation

The Company reserves the right to cancel, add, delete at its sole discretion, all or any terms of this GCC or any contract, order or terms agreed between the parties in pursuance without assigning any reasons and without any compensation to the Associates.

26.2 Severability

If any portion of this GCC is held to be void, invalid, or otherwise unenforceable, in whole or part, the remaining portions of this GCC shall remain in effect.

26.3 Order of Priority

In case of any discrepancies between the stipulations in General Conditions of the Contract (GCC) and Special Conditions of Contract (SCC), the GCC shall stand superseded by the SCC to the extent stipulated hereinabove while balance portion of respective clauses of GCC shall continue to be applicable.

27.0 INSURANCE

The Associate shall arrange accident insurance policy for his foreign experts/specialists/personnel deputed to Site and Associate's/his sub-Associates' manufacturing works as well as for his Indian engineers and supervisory staff. The Associate shall also take out for his Indian workmen, where applicable, a separate policy as required under Workmen's Compensation Act.

Associates shall be responsible to suitably insure their entire work-force (to the extent of at least meeting requirements under Workmen Compensation Act) Tools, Plant, Third party liability at the project site, All Risk comprehensive insurance for the entire works (insurance for free issue items will be in TPCODL scope) for total contract (PO/RO) value or any other such risks during execution of works, till the works are handed over to the company, in consultation with TPCODL and shall submit copies of such insurances to the Engineer-in-Charge for review / acceptance before commencing the work. Engineer-in-charge must ensure compliance to insurance requirement by Associate before commencement of works. TPCODL shall stand fully indemnified in this respect.

28.0 ERRORS AND OMISSIONS

The Associate shall be responsible for all discrepancies, errors and omissions in the drawings, documents or other information submitted by him, irrespective of whether these have been approved, reviewed or otherwise accepted by the TPCODL or not. However any error in design/drawing arising out of any incorrect data/written information from TPCODL will not be considered as error and omissions on part of the Associate.

29.0 TRANSFER OF TITLES

The title of ownership and property to all equipment, installations, erections, constructions materials, drawings & documents shall pass to the TPCODL after Commissioning and complete handing over-taking over.

However, such passing of title of ownership and property to the TPCODL shall not in any way absolve, dilute or diminish the responsibility and obligations of the Associate under this Contract including loss or damages and all risks, which shall vest with the Associate.

The Associate shall take all corrective measures arising out of discrepancies, errors and omissions in drawings and other information within the time schedule and without extra cost to the TPCODL.

The Associate shall also be responsible for any delay and/or extra cost if any, in carrying out engineering, and site works by other agencies arising out of discrepancies, errors and omissions stated in as well as of any late revision/s of drawings and information submitted by the Associate.

30.0 SUGGESTIONS & FEEDBACK

We welcome all our Business Associates to write to us about their experience with TPCODL; be it our Company, our services or our people. Each and every concern, issue, query and suggestion from you will help us to become a better company to work with and shall help us develop a strong bonding of trust and a long term relationship with you.

You may send your feedback by filling up our Business Associate Feedback Form enclosed herewith as Annexure-I. You can also log on to our website www.tpcentralodisha.com to provide your feedback according to the guidelines mentioned below:

31.0 CONTACT POINTS

In case Business Associate needs information with respect to payments or has any grievances, same may be lodged by log on to our website www.tpcentralodisha.com

32.0 LIST OF ANNEXURES

S. No.	Subject	Annexure
1.	Performa for Bid Security Bank Guarantee	A
2.	Performa for Advance Payment Bank Guarantee	B
3.	Performa for Performance Bank Guarantee (CP cum EP)	C
4.	Performa for No Demand Certificate by Associate	D
5.	Performa for Indemnification on Statutory Compliance	E
6.	Performa For Application For Issuance of Consolidated TDS Certificate	F
7.	HR Service Level Agreement	G
8.	Under taking for competence of workmen	H
9.	Business Associate Feedback Form	I
10.	Acceptance Form For Participation In Reverse Auction Event	J
11.	NEFT or RTGS payment request form	K
12	Contractor Safety Management System	L
13	Vendor Appraisal Form	M
14	Manufacturers Authorization Form	N

ANNEXURE-A

PROFORMA FOR BID SECURITY BANK GUARANTEE

TP Central Odisha Distribution Limited

Bhubaneswar

WHEREAS, (Name of the Bidder) _____ (hereinafter called "the BIDDER") has submitted his bid dated_____ for the (Name of Contract) _____ (hereinafter called "the BID").

KNOW ALL men by these presents we (Name of the Bank) _____ of (Name of the Country) _____ having our registered office at_____(hereinafter called "the BANK) are bound unto TP Central Odisha Distribution Limited (TPCODL) in the sum of _____ for which payment well and truly to be made to the TPCODL the Bank binds himself, his 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**:**

i) If the Bidder withdraws his Bid during the period of bid validity specified in the Proforma of Bid

or

ii) If the Bidder having been notified of the acceptance of his Bid by the TPCODL during the period of bid validity fails or refuses to furnish the Contract Performance Bank Guarantee, in accordance with the Instructions to Bidders.

We undertake to pay the TPCODL upto the above amount upon receipt of its first written demand, provided that in its demand the TPCODL will note that amount claimed by it is due to it owing to the occurrence of one or both conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force upto and including the date (No of days as mentioned in tender enquiry) days after the closing date of submission of bids as stated in the Invitation to Bid or as extended by you at any time prior to this date, notice of which extension to the Bank being hereby waived, and any demand in respect thereof should reach the Bank not later than the above date.

DATE…… SIGNATURE OF THE BANK……..

WITNESS……. SEAL……..

(Signature, Name & Address)

(At least 2 witnesses)

ANNEXURE-B

PROFORMA FOR ADVANCE PAYMENT BANK GUARANTEE

(On Rs.100/- Stamp Paper)

Note:

(a) Format shall be followed in toto

(b) Claim period of six months must be kept up

(c) The guarantee to be accompanied by the covering letter from the bank confirming the signature to the guarantee

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TP Central Odisha Distribution Limited

Bhubaneswar

Advance Payment B.G.No……

Contract No……dated……

1. You have entered into a Contract No_____ with M/s._____ (hereinafter referred to as "the Vendor") for the supply and delivery of _____

   (hereinafter referred to as" the said Equipment") for the price and on the terms and conditions contained in the said contract.

2. In accordance with the terms of the said contract, you have agreed to make an advance payment of Rs._____ (Rupees_____ only) being _____% (_____percent) of the total value of the contract on "the Vendor" furnishing you with an irrevocable, unconditional and acceptable bank guarantee to be valid till the date of receipt of "the said equipment" covered by your above mentioned contract. For this purpose you have agreed to accept our guarantee.

3. In consideration thereof, we, _____ hereby irrevocably and unconditionally guarantee to pay to you on demand but in any case before the end of five working days from the date of the claim and without demur and without reference to "the Vendor" such amount or amounts not exceeding the sum of Rs._____ (Rupees _____ only) being _____% (_____percent) of the total value of the contract on receipt of your intimating that "the Vendor" has not fulfilled his contractual obligations. You shall be the sole judge for such non-fulfillment and "the Vendor" shall have no right to question such judgment.

4. You shall have the right to file / make your claim on us under the guarantee for a further period of three months from the date of expiry.

5. This guarantee shall not be revoked without express consent and shall not be affected by your granting time or any other indulgence to "the Vendor", which shall include but

not be limited to, postponement from time to time of the exercise the same in you or any right which you may have against "the Vendor" and to exercise the same in any covenant contained or implied in the said contract or any other course or remedy or security available to you, and our Bank shall not be released from its obligations under this guarantee by your exercising any of your rights with reference to matters aforesaid or any of them or by reasons of any other act or forbearance or other acts of omission or commission on your part or any other indulgence shown by you or by any other matter or thing whatsoever which under the law would, but for this provision have the effect of relieving our bank from its obligation under this guarantee.

6. We also agree that you shall be entitled at your option to enforce this guarantee against our bank as a principal debtor, in the first instance, notwithstanding any other security or guarantee that you may have in relation to "the Vendor's" liabilities in respect of the premises

7. This guarantee shall not be affected by any change in the constitution of our Bank or "the Vendor" or for any other reason whatsoever.

8. Any claim / extension under the guarantee can be lodge-able at outstation banks or at Bhubaneswar branch and claim will also be payable at Bhubaneswar Branch (**to be confirmed by Bhubaneswar Branch by a letter to that effect)**

9. Notwithstanding anything herein contained, our liability under this guarantee is limited to Rs._____
(Rupees_____ only) and the guarantee will remain in force upto and including _____(Date) and shall be extended from time to time for such period or period as may be desired by "the Vendor".

10. Unless a demand or claim under this guarantee is received by us in writing within one month from_____ (expiry date) i.e. on or before _____ (claim period end date), we shall be discharged from all liabilities under this guarantee thereafter.

Dated at _____this _____ day of _____ 200_____

Witness

Bank's rubber stamp

1. _____ Banks full address

Designation of Signatory

2. _____ Bank official number

ANNEXURE- C

PROFORMA FOR PERFORMANCE BANK GUARANTEE (CP cum EP)

(On Rs.100/- Stamp Paper)

Note:

(a) Format shall be followed in toto

(b) Claim period of one month must be kept up

(c) The guarantee to be accompanied by the covering letter from the bank confirming the signature to the guarantee

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TP Central Odisha Distribution Limited

Bhubaneswar

CP cum EP BG No…….

Order/Contract No……dated……

1. You have entered into a Contract No _____ with M/s._____ (hereinafter referred to as "the Vendor") for the supply cum erection / civil work of _____ (hereinafter referred to as" the said Equipment") for the price and on the terms and conditions contained in the said contract.
2. In accordance with the terms of the said contract, "the Vendor" agreed to furnish you with an irrevocable, unconditional and acceptable bank guarantee for 10% of the value of contract and to be valid till the end of Guarantee period plus one month towards "Contract cum Equipment performance". For this purpose you have agreed to accept the guarantee.
3. In consideration thereof, we, _____ hereby irrevocably and unconditionally guarantee to pay to you on demand but in any case before the end of five working days from the date of the claim and without demur and without reference to "the Vendor" such amount or amounts not exceeding the sum of Rs._____ (Rupees _____ only) being _____% (_____ percent) of the total value of the contract on receipt of your intimating that "the Vendor" has not fulfilled his contractual obligations. You shall be the sole judge for such non-fulfillment and "the Vendor" shall have no right to question such judgment.
4. You shall have the right to file / make your claim on us under the guarantee for a **further period of three month** from the date of expiry.
5. This guarantee shall not be revoked without express consent and shall not be affected by your granting time or any other indulgence to "the Vendor", which shall include but not be limited to, postponement from time to time of the exercise the same in you or any right which you may have against "the Vendor" and to exercise the same in any covenant contained or implied in the said contract or any other course or remedy or security

available to you, and our Bank shall not be released from its obligations under this guarantee by your exercising any of your rights with reference to matters aforesaid or any of them or by reasons of any other act or forbearance or other acts of omission or commission on your part or any other indulgence shown by you or by any other matter or thing whatsoever which under the law would, but for this provision have the effect of relieving our bank from its obligation under this guarantee.

6. We also agree that you shall be entitled at your option to enforce this guarantee against our bank as a principal debtor, in the first instance, notwithstanding any other security or guarantee that you may have in relation to "the Vendor's" liabilities in respect of the premises
7. This guarantee shall not be affected by any change in the constitution of our Bank or "the Vendor" or for any other reason whatsoever.
8. Any claim / extension under the guarantee can be lodge-able at outstation banks or at Bhubaneswar branch and claim will also be payable at Bhubaneswar Branch (to be confirmed by Bhubaneswar Branch by a letter to that effect in case BG is from the branch outside Bhubaneswar)
9. Notwithstanding anything herein contained, our liability under this guarantee is limited to Rs._____ (Rupees_____ only and the guarantee will remain in force upto and including _____(Date) and shall be extended from time to time for such period or period as may be desired by "the Vendor".
10. Unless a demand or claim under this guarantee is received by us in writing within one months from_____ (expiry date) i.e. on or before _____ (claim period end date), we shall be discharged from all liabilities under this guarantee thereafter.

Dated at_____ this_____ day of _____ 200__

Witness

Bank's rubber stamp

1. _____ Banks full address

Designation of Signatory

2. _____ Bank official number

ANNEXURE-D

PROFORMA FOR "NO DEMAND CERTIFICATE" BY ASSOCIATE

(On Company's Letter head or with Company Seal)

(To be submitted by the Associate to TPCODL Accounts Department at the time of receipt of full and final payment)

(Certificate No. CCP/002)

Name of the Project

Order/ Contract No.

Dated

Name of the Associate

Scheme No. / Job No.

We, M/s._____ (Associate) do hereby acknowledge and confirm that we have received the full and final payment due and payable to us from TPCODL, in respect of our aforesaid Order No _____ dated_____ including amendments, if any, issued by TPCODL to our entire satisfaction and we further confirm that we have no claim whatsoever pending with TPCODL under the said contract / W.O.

Notwithstanding any protest recorded by us in any correspondence, documents, measurement books and / or final bills etc., we waive all our rights to lodge any claim or protest in future under this contract.

We are issuing this "NO DEMAND CERTIFICATE" in favour of TPCODL, with full knowledge and with our free consent without any undue influence, misrepresentation, coercion etc.

Dated **Signature**

Place **Name**

Designation

(Company Seal)

ANNEXURE – E

PROFORMA FOR "INDEMNIFICATION ON STATUTORY COMPLIANCES"

(To be submitted by the successful Bidder within seven days of award of work)

(Certificate No. CCP/001)

Name of the Project

Letter of Award / Contract No.

Dated

Name of the Associate

Scheme No. / Job No.

By this confirmation we, _____ (Associate) are formally bound to M/s. TPCODL towards any sum which may be imposed, levied or hereinafter recovered by the Provident Fund Organization under the provisions of the Employees of the Provident Fund and Miscellaneous Provisions Act 1952 in respect of employees employed by us.

We well and truly bind ourselves and our heirs executors administrators and representatives jointly severely and respectively for the above payment only to be paid to M/s. TPCODL.

AND WHEREAS we, _____ (Associate) is making compliance of the Employees Provident Fund and Miscellaneous Provisions Act 1952, have entered into the above written bond for the indemnity to M/s. TPCODL against all losses from the acts or default of the said Associate in respect of compliance of the Provident Fund Act.

Similarly we hereby confirm that we have complied with all statutory and local laws and nothing is outstanding with regard to Local Sales Tax, Labour Laws, Local Municipal dues, Electricity dues etc. We have entered into the above written bond for the indemnity to M/s. TPCODL against all losses from the acts or default of the said Associate in respect of compliance of the Local Sales Tax Laws, Local Laws, Labour Laws, Local Municipal Dues, Electricity dues etc.

NOW THE CONDITION, of the above written bond is as such that if the Associate during the period of this contract commits any default or fails to make payment of Contributions in respect of his employees to the Employees Provident Fund Organization, he shall indemnify the Principal Employer M/s. TPCODL from all and every loss and damage caused to them from any act, omissions or negligence of the said Associate in respect of compliances under the Employees Provident Fund and Miscellaneous Provisions Act, 1952.

IN WITNESS to the above written bond we have here to set our hands, with our free consent.

Dated **Signature**

Place **Name**

Designation (Company Seal)

ANNEXURE-F

PROFORMA FOR APPLICATION FOR ISSUANCE OF CONSOLIDATED TDS CERTIFICATE

To be printed on the letterhead

To,

TP Central Odisha Distribution Limited,

Bhubaneswar

Sub: Application for issuance of Consolidated TDS Certificate for the FY _____

Dear Sir,

I / we hereby request / authorize you to issue me / us a consolidate TDS Certificate for the financial year _____ against tax deducted at source by you from my / our payments / bills during the said year from time to time under Chapter XVII – B of the Income Tax Act, 1961.

For and on behalf of

Signature

Name

Address

Contact No. (Land Line)

(Mobile)

PAN #

Assessing authority

ATTACH THE COPY OF PAN CARD

ANNEXURE - G

SERVICE LEVEL AGREEMENT

(To be adhered to by Business Associates (BAs) in TPCODL on Human Resource Issues)

1.0 The following shall be adhered to by the Business Associates during his / its association with TPCODL:

Shall Abide by Tata Core Values:

a) Integrity – We must conduct our business fairly, with honesty and transparency. Everything we do must stand the test of public scrutiny.

b) Understanding – We must be caring, show respect, compassion and humanity to our colleagues and customers and always work for the benefit of the communities we serve.

c) Excellence – We must constantly strive to achieve the highest possible standards in our day to day work and in the quality of services we provide.

d) Unity – We must work cohesively with our colleagues across the group and with our customers and partners to build strong relationships based on tolerance, understanding and mutual co-operation.

e) Responsibility – We must continue to be responsible and sensitive to the communities and environments in which we work and always ensuring that what comes from the people; goes back to the people many times over.

f) Agility- We must work in a speedy and responsive manner and be proactive and innovative in our approach.

2.0 The Business Associate / his manager / supervisor who is responsible for managing the project site / performance contract etc. in TPCODL would also ensure adherence of these values by his employees / persons deployed by him in connection with his works undertaken in TPCODL.

3.0 The Business Associates are required to:

a) Support and respect the protection of human rights and make sure that they are not complicit in human right abuses.
b) Respect freedom of association and effective recognition of the right to collective bargaining.
c) Not to resort to any form of forced and compulsory labour.
d) Shall ensure abolition of child labour in his area of work.
e) There is no discrimination in respect of employment and occupation in respect of his employees.
f) Support precautionary approach to environmental challenges.
g) Promote greater environmental responsibility by himself and his employees in his areas of work.
h) Deploy and defuse environmental friendly technologies while carrying out the works.
i) Work against corruptions in all its form including extortion and bribery by himself and his employees.

4.0 The Business Associates are required to adhere to all applicable Labour Laws with special reference to the following:

a) No person below the age of 18 years and no child labour will be engaged directly or indirectly for executing the work connected with the business of TPCODL.

b) Minimum wages along with other statutory dues like PF, ESI, etc. as applicable to the workers shall be made within the prescribed period of 7th / 10th day of the following month.

c) Deduction / deposit / record keeping and all other requirements under Employees PF Act 1952, Employees State Insurance Act 1948 and other applicable acts (if any) shall be adhered to.

d) Only statutorily authorized deductions (if any) shall be made in accordance with the relevant statutes.

e) All the provisions of Contract Labour (R&A) Act 1970 shall be complied with in respect of the workers engaged for TPCODL work. The work will be commenced only after completing necessary formalities for obtaining Labour License (if applicable).

f) Necessary registers / records, filing of returns etc. shall be maintained for verification by Statutory / TPCODL authorities.

g) Payment of wages shall be made only in presence of and with certification of authorized representative of TPCODL or shall be made in the form of cheque / bank transfer to the employee.

h) During the period of contract, the Business Associate will arrange for deployment of his supervisor / manager for total supervision and control of the work and their manpower. All the activities related to their manpower e.g. attendance, leave, wage disbursement etc. will be done under the supervision & control of Business Associates, While adhering to the prescribed standard / norms of production / productivity & quality. During execution of the work, Business Associate shall engage only such qualified / skilled manpower as may be envisaged / required for ensuring level of production / service into the contract / work order.

i) Clearances as follows shall be obtained from IR & Welfare Group:

   i. Clearance for commencement (before start of the work).
   ii. No Objection Certificate (after completion / before final settlement).
   iii. Copies of PF / ESI Challans shall be deposited with IR & Welfare Group every month

j) The Business Associate shall indemnify TPCODL from any liabilities under applicable Labour Statutes.

k) The Business Associate shall ensure safety and health of his employees and shall also maintain hygienic working environment / condition in his area of work.

l) The Business Associate and his employee shall abide by Laws of Land and shall not violate any applicable provisions.

m) The Business Associate appreciates with and acquiesces to the right of TPCODL as principal employer to fulfil any of his legal obligations, if he fails to do so under applicable labour laws and deduct the same from his running bills / final payments / enchasing security deposit / Bank Guarantee as the case may be. If there is any further shortfall TPCODL has the right to recover the same from the Business Associate.

n) The Business Associate ensures that person employed by him adhere to the moral and legal conduct and shall not violate any standard conduct envisaged in the premise of

TPCODL by all such as, Transparency, Safety, Discipline, Integrity etc. The Business Associate or his employees should refrain from corrupt practices, giving or taking bribe in connection with any TPCODL business.

5.0 The '<u>Statutory Compliance Enforcement System</u>' in TPCODL is detailed below for adherence by all concerned. Business Associate Cell (BA Cell) will be the process owner for implementation of the system with the help of concerned Engineer I/c or Officer I/c.

a) Statutory Compliance being a professed value in TPCODL Code of Conduct, the concerned Engineer / Officer in charges are requested to adhere to the provisions and advise respective Business Associates in their domain to comply in letter and spirit.

b) Immediately after issuance of letter of intent, the authorized representative of the Business Associate will report to BA Cell for completion of statutory requirements.

c) Normally, the work will be started only after 'Clearance for Commencement of Work (CCW) is issued by BA Cell to the Business associate. However in exceptional exigencies in engineer I/c / Officer I/c may direct the Business Associate to start the work and inform BA Cell about the same. Statutory requirements in this case may be completed in parallel.

d) First monthly bill will be released only after producing CCW to the finance department. Similarly closure of work and final settlement will be affected after issuance of no objection certificate from BA Cell group.

6.0 <u>Requirements for 'Clearance for Commencement of Work' (CCW):</u>

a) Submission of filled up Form 'A' for database (Annexure-1).
b) Copy of PF Code allocation letter.
c) Copy of ESI Code allocation letter.
d) Submission of duly filled up Form IV CL(R&A) act (In case more than or equals to 20 workers during the period of contract).
e) Submission of duly filled up Form VI A (Notice of Commencement).
f) Copy of insurance cover note under WC Act 1923 (if applicable).
g) Copy of Contract Agreement.
h) Copy of indemnity bond (if applicable).
i) Affidavit with regard to payment of wages through cheque / bank transfer only.

7.0 <u>Requirements during execution of work:</u>

a) Copy of receipt of application for license / license (if applicable).
b) Copy of PF Challan (latest by 26th day of every Month).
c) Copy of ESI Challan (latest by 26th day of every Month).
d) Copy of Wage disbursement sheet / Bank statement.
e) Filing / Maintenance of all statutory registers / reports / returns for inspection by Statutory/ TPCODL authorities.
f) Certification of wage disbursement by authorized representative of TPCODL.
g) Copy of 'Labour Welfare Fund' deposit certificate / Challan.
h) Insuring safe working practices at the work place.

8.0 <u>Requirements for 'No Objection Certificate' (NOC) for closure of work:</u>

a) Submission of duly filled up Form VI A (Notice of Completion).
b) Copy of Half yearly / Annual return for ESI / PF / CL(R&A).

c) Consolidated copy of wage sheet of last month indicating full & final settlement of all dues like retrenchment benefit, bonus, leave encashment etc. Copy of individual declaration by employees in Form X regarding termination of employment.

d) Confirmation certificate regarding filling up of form for transfer / withdrawal of PF by the concerned workers.

In case any of the above are deviated / not complied with the Letter of Award/Order shall be liable to be withdrawn / cancelled.

Enclosure:

1) Form A
2) Form X
3) Form XI
4) Form VI A
5) Form XXIV

FORM (A)

[To be submitted by the Business Associate to the Principal Employer within a week from LoA issuance]

A. Details of the Agency

1. Name of Agency :
2. Nature of work :
3. Local Address with Ph.No. :

   (With Father's name) :
4. Permanent Address (Full) :
5. PF code no. & Place :
6. ESI Code no. & Place :
7. Name and address of :

   Sub-contractor (if any)

B. Details of Work

8. Name of work (as specified in LOI/LOA) :
9. LOI/LOA Nos. & Dates :
10. Period of contract (Specify Dates) :

    [Including Extension period, if any] :
11. Work Area [Department / Location] :
12. Name / Cell no. of Officer I/c :
13. Maximum No. of workers and staff to be engaged on any day during the year.
    - Supervisory Staff :
    - Workers :
14. Do you have any other contract in TPCODL : Yes/No

    If yes, furnish details:

15. Details of Workmen's compensation Policy, if applicable

Name of Insurance Company ……... ……Policy No …… Number of persons covered …… Period of coverage: From …….. To ……..

If no, I hereby undertake the liability arising out of Workmen's Compensation Act and Rules made there under.

C. Details of workers to be engaged

No. of Workers

S. No.	Unskilled*	Semi-skilled*	Skilled*	Clerical / Supervisory

*** Number to be indicated**

I/We shall fulfill all obligations arising from and under all relevant law in force from time to time. I/We undertake to keep the TPCODL indemnified against any loss or liability arising out of failure of my / our abiding the relevant laws.

The name of my / our representatives is …… to enter the TPCODL Premises on my behalf.

Date:

(Signature of the Business Associate

or his Authorized Representative)

This Business Associate is / will be engaged in TPCODL.

(Signature and seal of

Officer I/c of the Work)

Form X

Undertaking

I _____ hereby undertake that all the dues in respect of my employment with M/s _____ for the period of _____ to _____have been settled and final payments including retrenchment benefit have been made to me in full.

( )

_____

Date:

Form XI

Undertaking

With reference to the contract job awarded by M/s TP Central Odisha Distribution Limited to M/s_____ vide work order No._____ dated_____

I _____on behalf of

M/s _____hereby undertake:

1. that the dues in respect of the workmen/ employee(s) engaged by us for the said contract, payable as per the provisions of relevant statute pertaining to
   i. wages/ salary
   ii. PF & ESI, Bhubaneswar Labour Fund
   iii. All other statutory obligation

   has been paid /settled in full and no amount/ compliance is due/ pending.

2. That in case any dispute / claim is raised by the concerned workers i.r.o. any dues / payments, M/s _____ will settle the same on it's own and such liability will be borne by M/s _____

3. That M/s _____ hereby indemnify M/s TPCODL from any future liability i.r.o. any statutory obligation in respect of said contract.

Date:

_____

( )

Authorized Signatory

For M/s _____

FORM- VI A

Notice for Commencement /Completion of contract work

I/We, Sh. / M/s _____ (Name and Address of the Contractor) hereby intimate that the contract work _____ (name of work) in establishment of the _____ (name and address of the Principal Employer) for which License No._____dated_____has been issued to me/us by the Licensing Officer _____(name of the Headquarters), has been commenced / completed with effect from _____date / on date.

Signature of Contractor

With Office Seal

The Inspector

_____

_____

FORM XXIV

[See Rule 82(1)]

Return to be sent by the Contractor to the licensing Officer (in duplicate)

Half -Yearly Ending_____

1. Name and address of the Contractor
2. Name and address of the Establishment
3. Name and address of the Principal Employer
4. Duration of Contract: From _____to _____
5. No. of days during the half year on which
   (a) the establishment of the principal employer had worked
   (b) the contractor's establishment had worked
6. Maximum No. of contract labour employed on any day during the half –year:

Men	Women	Children	Total

7. (i) Daily hours of work and spread over
   (ii) (a) whether weekly holiday observed and on what day
   (b) if so, whether it was paid for
   (iii) No. of man – hours of overtime worked
8. No. of man days worked by

Men	Women	Children	Total

9. Amount of wages paid

Men	Women	Children	Total

10. Amount of deductions from wages, if any

Men	Women	Children	Total

Whether the following have been provided –

(i) Canteen : _____

(ii) Rest rooms : _____

(iii) Drinking water : _____

(iv) Crèches : _____

(v) First Aid : _____

Signature of contractor

Place _____

Date _____

ANNEXURE – H

UNDERTAKING FOR COMPETENCE OF WORKMEN

Name of Associate :

Tender No. :

Item :

With reference to the tender mentioned above, I/We _____, hereby undertake that the workmen/ employee(s) engaged by M/s _____ for the job against said tender shall be competent in all respect, commensurate to the nature of job.

Date:

_____

( )

Authorized Signatory

For M/s

Seal

ANNEXURE-I

BUSINESS ASSOCIATE FEEDBACK FORM

With an objective to improve our internal processes and systems, and serve you better, we solicit your valuable feedback & suggestions. It is estimated that it will take about 10 minutes to complete this survey. We assure you that your feedback shall be kept confidential. Please send the duly filled feedback form in the "TPCODL addressed - attached envelop"

You are associated with us as
☐ OEMs ☐ Service Contractor ☐ Material Suppliers ☐ Material & Manpower Supplier

You are associated with us for
☐ Less than 1 year ☐ More than 1 year but less than 3 years ☐ More than 3 years

Your office is located at
☐ Bhubaneswar ☐ Within 200 kms from Bhubaneswar ☐ More than 200 kms from Bhubaneswar

Your nearly turnover with TPCODL
☐ Less than 25 Lacs ☐ 25 Lacs to 1 Crore ☐ More than 1 Cr.

Additional information

Your Name	
Your Designation	
Your Organization	
Contact Nos.	
Email	

We once again thank you for your participation in this survey. Please spare 10 minutes to give your feedback on following pages (Section A to E)

SECTION - A

(Please √ mark in the relevant box and give your remarks / suggestions / information for our improvement.).

S. No.	Parameters	1 Do Not Agree	2 Slightly in Agreement	3 In Fair Agreement	4 Mostly in Agreement	5 Fully Agree	Remarks/ Suggestion
1	You receive all relevant queries / tenders from us in timely manner.						
2	We provide you enough lead time to respond to our queries / tenders.						
3	We provide you adequate support (drawings, documents, clarifications, briefing etc.) to enable you meet our requirements.						
4	All following elements of our contract / purchase order are rational :						
4.1	Scope of Work						
4.2	Delivery / Execution Schedule						
4.3	Payment Terms						
4.4	Liquidated Damages						
4.5	Performance Guarantee						
5	Our purchase orders / contracts are simple, specific & easy to understand						
6	TPCODL demonstrate willingness to be flexible in administration of Contract / Purchase Order						
7	We provide timely responses / clarifications to your queries						
8	TPCODL representative you interact / coordinate with is adequately empowered to support you in meeting contractual obligations						
9	TPCODL provide you all necessary infrastructure support for timely and quality completion of work (including AMC)						
10	TPCODL Engineer-in-Charge timely certifies the jobs executed/ material supplied						

S. No.	Parameters	1 Do Not Agree	2 Slightly in Agreement	3 In Fair Agreement	4 Mostly in Agreement	5 Fully Agree	Remarks/ Suggestion
11	TPCODL Engineer-in-Charge efficiently supervises the job execution for timely completion of job						
12	BIRD (Bill Inward Receipt Desk) initiative has improved payment disbursement process						
13	Our approach for Inspection and Quality Assurance effective to expedite project completion?						
14	TPCODL never defaults on contractual terms						
15	In TPCODL Contracts closure is done within set time limit						
16	Our material receiving procedures are well defined and efficiently deployed to reduce mutual inconvenience						
17	Bank Guarantees are released in time bound manner						
18	Our processes related to payment / account settlement are effective.						
19	You get payments on time						
20	TPCODL Employees follow Ethical behaviour						

SECTION - B

(Please rate the following parameters on a scale of 1 to 5, where 1 - Minimum; 5 - Maximum)

SN	Parameters	1	2	3	4	5	Remarks/ Suggestion
1	How do you rate courtesy/ empathy/ attitude level and warmth of TPCODL employees you interact with from following team?						
1.1	Project Engineering						
1.2	Division / Sub-Division						
1.3	Projects/HOG						
1.4	Inspection & Quality Assurance						
1.5	Stores						
1.6	Metering & Billing						
1.7	Accounts / Finance						
1.8	Administration						
1.9	IT & Automation						
2	How would you rate TPCODL in comparison to your other clients in terms of **fairness of treatment and transparency** with its Business Associates?						
3	How would you rate TPCODL in comparison to your other clients in terms of **processes and systems to manage partnership** with its Business Associates						
4	How would you rate TPCODL in comparison to your other clients in terms of **building long term & mutually relations**hip with its Business Associates						

SECTION–C

Please √ mark in the relevant box and give your remarks / suggestions / information for our improvement.

SNo	Parameters	Certainly NO	Probably NO	Probably YES	Certainly YES	Remarks/ Suggestion
1	Based on your experience with TPCODL, would you like to continue your relationship with TPCODL?					
2	If someone asks you about TPCODL, would you talk "positively" about TPCODL?					
3	Would you refer TPCODL name to others in your community, fraternity and society as a professional & dynamic organization?					

SECTION - D

If we ask you to rate us on a scale of 1 to 10, how will you rate TPCODL, that truly represents your overall satisfaction with us (please tick appropriate box) -

1	2	3	4	5	6	7	8	9	10

SECTION – E

Please √ mark in the relevant box and give your remarks / suggestions / information for our improvement.

Please spare your thoughts for TPCODL's improvement in particular areas of weaknesses, particularly relating to some great practices, attitudes that you have seen elsewhere in Indian and International Organizations, which you recommend TPCODL to adopt. Please give your valuable salient recommendations.

Please spare your thoughts for TPCODL's improvement in particular areas of major concerns for you. We also welcome your suggestions to adopt any best practices, altitudes that you have observed / experienced elsewhere in Indian/ International organization.

Recommendation	*Please tick (√) your top 5 expectations out of the following 10 points listed below -*	
(Please list down improvement you expect from TPCODL)	*Timely payment*	
1	*Flexibility in Contracts/PO*	
	Clarity in PO,s & Contracts	
2	*Timely response to quarries*	
	Timely certification of works executed	
3	*Clarity in Specs, drawings, other docs etc.*	
	Adequate information provided on website for tender notification, parties qualified etc.	
4	*Timely receipt of material at site for execution*	
	Performance Guarantee/EMD released in time	
5	*Inspection & quality assurance support for timely job completion*	

We thank you for your time and courtesy!!

ANNEXURE-J

ACCEPTANCE FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT

(To be signed and stamped by the bidder prior to participation in the auction event)

In a bid to make our entire procurement process more fair and transparent, TPCODL intends to use the reverse auctions through SAP-SRM tool as an integral part of the entire tendering process. All the bidders who are found as technically 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. TPCODL shall provide the user id and password to the authorized representative of the bidder. *(Authorization Letter in lieu of the same shall be submitted along with the signed and stamped Acceptance Form).*
2. TPCODL will make every effort to make the bid process transparent. However, the award decision by TPCODL would be final and binding on the supplier.
3. The bidder agrees to non-disclosure of trade information regarding the purchase, identity of TPCODL, bid process, bid technology, bid documentation and bid details.
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 TPCODL.
6. In case of intranet medium, TPCODL shall provide the infrastructure to bidders. Further, TPCODL 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 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 outrightly rejected by TPCODL.
8. The bidder shall be prepared with competitive price quotes on the day of the bidding 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 at TPCODL 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 TPCODL.
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-K

To,

DGM (Finance)

The TP Central Odisha Distribution Limited
Bhubaneswar

Sub: **e-Payments through National Electronic Fund Transfer (NEFT) OR Real Time Gross Settlement System (RTGS)**

Dear Sir,

We request and authorize you to affect e-payment through NEFT/RTGS to our Bank Account as per the details given below:-

Vendor Code :

Title of Account in the Bank :

Account Type :

(Please mention here whether account is Savings/Current/Cash Credit)

Bank Account Number :

Name & Address of Bank

:

Bank Contact Person's Names :

Bank Tele Numbers with STD Code :

Bank Branch MICR Code :

(Please enclose a Xerox a copy of a cheque. This cheque should not be a payable at par cheque)

Bank Branch IFSC Code :

(You can obtain this from branch where you have your account)

:

Email Address of accounts person (to

send payment information)

Name of the Authorized Signatory :

Contact Person's Name :

Official Correspondence Address :

We confirm that we will bear the charges, if any, levied by our bank for the credit of NEFT/RTGS amounts in our account. Any change in above furnished information shall be informed to TPCODL well in time at our own. Further, we kept TPCODL indemnified for any loss incurred due to wrong furnishing of above information.

Thanking you,

For _____

(Authorized Signatory)

(Signature with Rubber Stamp)

Certification from Bank:

We confirm that we are enabled for receiving NEFT/RTGS credits and we further confirm that the account number (specify Bank a/c no.) of (Please mention here name of the account holder), the signature of the authorized signatory and the MICR and IFSC Code of our branch mentioned above are correct.

This also is certified that the above information is correct as per Bank record

(Manager's/ Officers Signature under Bank Stamp)

ANNEXURE-L

CONTRACTOR SAFETY MANAGEMENT SYSTEM

1. OBJECTIVE

The objective of the Contractor Safety Management System is to lay down clear guidelines for all Business Associates (including their associates, staff and agents) which would facilitate them to observe all statutory rules and regulations, comply with applicable standards of Central Electricity Authority (Measures relating to safety and electric supply) Regulations, 2010 & (safety requirements for construction, operation and maintenance of electrical plants and electric lines) Regulations,2011, TPCODL Safety Manual and Guidelines and thus, ensure creation of safe working environment for all stakeholders of our network.

2. SCOPE

All contracts (minor and major) will be subject to the provisions of this document.

Minor Contracts: Contracts which satisfy all the criteria listed under the head "Minor Contracts".

Major Contracts: Contracts which satisfy any two or more criteria listed under the head "Major Contracts"

Criteria	Minor Contracts	Major Contracts
Value of Contract	< Rs. 1500000/- (less than Rs. Fifteen Lac)	>= Rs. 1500000/- (Equal or more than Rs. Fifteen Lac)
Period	Period less than 1 year	Any period
Working on energized electrical equipment	No	Yes
Working on height (above 1.8 Mtrs from ground)	No	Yes
Work involving construction activity	No	Yes
Working with hazardous goods or chemicals	No	Yes
Work involving danger to general public	No	Yes

Note: *Exceptions for major and minor contract are – in house software development, supply of material or equipment but no direct or indirect installation of the same material, administration contracts (courier, water supply, printing, security, transport, etc.), minor civil work like plastering at ground level or flooring, etc. The facility management (housekeeping) contract will always be treated as a minor contract.*

3. INFORMATION REQUIRED AT TIME OF VENDOR REGISTRATION OR BEFORE COMMENCEMENT OF CONTRACT

3.1 Business Associate is required to fill the Safety Management System Questionnaire as per *annexure 1* and submit along with the vendor registration process / bid / tender document. The filled questionnaire will be scrutinized by Engineer In-charge / indenting group and recommend suitability of the BA with respect to safety requirements. The fulfilment of statutory requirements for vendor registration pertaining to labour laws etc. shall be done by BA Cell on being referred to it.

3.2 Business Associate is required to take suitable risk control measures mentioned against the identified Hazards and Risk document provided for all contracts as per *annexure 2*. The primary objective of this is to evaluate the understanding of the BA towards risk mitigation and employment of safe work procedures. BA is required to conduct the Hazard identification and Risk Assessment study as per the procedure and deploy more or other measures if deemed necessary.

3.3 Business Associate shall comply with **Statutory Requirements related to Safety and Occupational Health** and submit the "Safety Undertaking" as per *annexure 4*.

4. GENERAL SAFETY CONDITIONS REQUIRED TO BE FULFILLED BY BUSINESS ASSOCIATES

The requirements of the contractor safety management system applicable to the minor or major contracts related to various groups are as following –

4.1 Maintenance of Distribution Network – *Annexure 3.1*
4.2 Distribution Projects – *Annexure 3.2*
4.3 EHV Projects – *Annexure 3.3*
4.4 Maintenance of Sub transmission network – *Annexure 3.4*
4.5 Civil / Generation Projects – *Annexure 3.5*
4.6 Meter Management Group (MMG), Revenue Recovery Group (RRG), Energy Auditing Group, AMI, MRG, etc. – *Annex3.6*
4.7 Maintenance and Operation of Street Light. **–** *Annexure 3.7*

1. *Please note that hydra cranes used by any dept should be ACE Model No. FX 150 ACE SX 150, Escorts Model No. TRX 1550 or contemporary. Use of old generation hydra cranes like ACE 14XW or ACE 12 XW, etc are prohibited.*

(*Details as per Annexure attached)*

Note: *For minor contracts, the BA shall assign the duties of Safety Representative to the Work Supervisor. Work Supervisor will deliver all duties and responsibilities of Safety Supervisor as detailed in this document.*

The Business Associate (BA) having major contract will appointing Safety supervisor, engineer / manager for the TPCODL work. The BA shall make all necessary arrangements for getting their workforce safety trained and competency checked from the concerned official of TPCODL before deployment in the field. BA Cell shall recommend the suitability after competency checked by Engineer In-charge and SAFETY group (or his representative) of TPCODL. After getting the clearance from concerned official, BA cell and receiving temporary I-card issued by TPCODL, Business Associate shall commence the working.

Safety Representative of Business Associates will formally become the nodal point for safety concerns for TPCODL. ***BA shall not frequently transfer or terminate the services of any of the safety representatives appointed for TPCODL work site. BA needs to ensure***

that Safety representative is available at all points of time; failing which the work being carried out in the interim (period when Safety representative is not available) shall be treated as working under improper supervision and due penal provisions shall be initiated against the BA. BA will be required to provide all applicable infrastructure and power to ensure smooth working of the safety representative to maintain a sound safety management system. **In all contracts safety representative will not be assigned any other activity at site apart from the works related to safety management. The duties are detailed in clause 5.5 of this document.** TPCODL will be auditing the facilities provided to the BA`s safety team time to time.

The Safety Representative of the BA shall be required to meet and follow the instructions of the Engineer In-charge and SAFETY Group of TPCODL. He shall be responsible for providing the MIS and/or any other relevant information, as and when desired, within the stipulated time frame as per the requirements of TPCODL. Any non-conformance to safety will lead to the negative marking or issue of safety violation challan/ tokens which shall affect the monthly evaluation and performance of BA.

All contracts where BA has to depute vehicle for their staff and equipment to move from one location to other, the BA shall ensure that vehicle complies all required statutory clearances and requirement as per The Motor Vehicle Act, 1988 as well as TPCODL Road Safety Policy and are in good & safe state of working.

5. QUALIFICATION AND EXPERIENCE OF THE SAFETY AND SITE PERSONNEL

Qualification and experience required for the safety and site personnel are as following:

5.1 Safety Supervisor: It is mandatory that educational qualification of safety supervisor be ITI (of relevant trade) / Diploma (Any branch of engineering) and he has a working experience on electrical system / relevant field of work at least 5 yrs for ITI and 3 years for Diploma holder. Having formal experience of the safety systems will be an added advantage

5.2 Safety Engineer: It is mandatory that educational qualification of safety engineer be at least Diploma (relevant branch) and he has working experience on electrical system of at least 3 yrs. Having the formal experience of the safety systems will be an added advantage.

5.3 Safety Manager: The educational qualification of safety manager should be graduate engineer with working experience on electrical system / network of at least 3 yrs. OR Diploma in Industrial Safety with working experience of 05 years including at least 02 years on electrical network.

However, clause 5.1, 5.2 and 5.3 are not applicable for minor contracts. In such cases, BA shall assign the duties of Safety Representative to the Work Supervisor. Work Supervisor will deliver required duties of Safety Representative (as per clause 5.5) in addition to other duties without diluting the importance of safety.

5.4 Site Skilled Personnel: For all responsibility related to site activities and operations, the BA shall employ only qualified and skilled persons and shall comply the provisions of section 19 & 29 of Central Electricity Authority (Measures relating to safety and electric supply) Regulations, 2010. Persons holding valid approvals only by any Government approved agency or a competency assessment panel or a team set up by TPCODL

shall be allowed to perform the High Risk / High Hazard activities (refer page 1). The skill / qualification required for the electrician and electrical supervisor are given in *annexure 5*. The contracts related to maintenance of Distribution Network, Distribution Projects, EHV Projects, maintenance of Sub-Transmission Network, MMG & EAG, maintenance and operation of street lights, shall preferably have at least 20 per cent of ITI qualified electricians in the first year of the contract. This figure shall preferably be incremented by 15 per cent every subsequent year.

Note: For the competency assessment may please refer the work instructions. An employee shall have to necessarily undergo the competency assessment check once in every eighteen months.

5.5 **Requirements from the Safety Representative(s) of the Business Associate:**

5.5.1 Safety training of 2 hrs/employee/month and one day of safety induction training to all new employees joining the BA will be conducted by the BA as per Safety training modules of TPCODL.

5.5.2 Safety Talk / tool box talk before start of shift to BA employees.

5.5.3 Ensuring the availability & proper usage of the standard safety equipment (PPE)

5.5.4 Periodic inspection of PPE to ensure their serviceability and maintaining the 10% buffer stock of standard PPEs.

5.5.5 Ensuring the adherence to standard operating procedures of TPCODL as mentioned in TPCODL Safety standard and O & M and concerned function's manual.

5.5.6 Safety inspections / audits as per the process of TPCODL

5.5.7 Working in close coordination SAFETY Group of TPCODL.

5.5.8 Reporting of unsafe acts, unsafe conditions, near miss, incident or accident to Engineer In-Charge and SAFETY Group of TPCODL immediately after its occurrence.

5.5.9 Regular HIRA at site and comply the control measures as stated in the detailed HIRA as per the *annexure* 2. Also deployment of JSA based checklist shall be ensured.

5.5.10 Ensuring compliance with safety and other laws as may be applicable and providing for safety assurance.

5.6 **Training and Syllabus:** The BA shall not deploy any person at work place / site or send newly recruited personnel directly to concerned official for competency assessment without Safety Induction Training.

5.6.1 All new BA employees have to necessarily undergo one and half days Safety training and Competency assessment at training centre of BA cell. This training will be conducted once in a week. After the completion of Safety training & Competency assessment I-card will be issued to all competent BA employees

5.6.2 BA is expected to initially train and judge the capability of the workman at his own end before further recommending the workmen for Competency assessment. If any BA workman sent for competency assessment. In case any BA workman fails in the Competency test at concerned official, it will be deemed that BA has not imparted sufficient training at his end and actual cost of training ₹ 7500/ BA employee/ failed attempt will be recovered.

5.6.3 The workers who have imparted Safety Training and issued I-Cards of TPCODL, are not deployed at TPCODL worksites/ voluntarily left the job by workers/ used somewhere else other than TPCODL by the BA, in that case Management reserves the rights to intervene and recover the actual cost of training i.e. ₹ 7500/BA employee. (*Exempted for attrition rate of BA workers less than or equal to 10% of total workforce deployed at TPCODL)*

5.7 It is desired that Safety representative of the BA to impart the general safety training to each employee of duration 2 hrs per month. The training will be organized at BA level and the record to be sent to engineer in-charge and SAFETY group of TPCODL every month. Please refer schedule and syllabus in *annexure 6*.

List of Personal Protective Equipment (PPE) and Maintenance schedule: BA shall commence the project or any work only when the required PPE are made available to the team of employees involved in the work. Each PPE of BA shall be checked / inspected by the safety representative / supervisor at zone before the work start or as prescribed in the list. Safety representative shall regularly check the healthiness of each PPE allocated to lineman. Suitable record shall be maintained at zone. Defective PPE shall be immediately replaced or within 24 hours by the BA. In no case linemen or any other official of BA may be allowed to work with defective PPE. It is preferred that BA ensures minimum stock of each PPE at zone for immediate replacement with defective one. The PPE shall be IS / BS / CE marked and exactly as per the standard or specification mentioned in the *annexure 7*. Working without PPE / non-standard PPE shall be treated as safety violation and penalty as stated in section 6.0 of this document. If TPCODL finds that BA has not provided the adequate / appropriate PPE to their staff, TPCODL reserves the rights to stop the work and call the BA to provide appropriate PPEs at the risk. If the BA fails to provide the required PPEs at the risk then the same shall be provided by TPCODL at the actual cost of the PPE. The amount shall be charged to BA and same shall be first recovered from the current bill of BA or any future payment to be made to BA. In the event of any balance amount still left for recovery, the same shall be adjusted against retention amount or by invoking bank guarantee submitted by BA.

5.8 Safety Audit / Inspection & HIRA: The BA shall get the required safety inspection / audit conducted by his technical team comprising of safety representative as per the *annexure 8*. The safety representative will be required to conduct the HIRA (Hazard Identification and Risk Assessment) *as per annexure 2* of the process and work undertaken at least two times in a year or every time if a new process / activity / machine is introduced or whenever an accident take place. The risk identified to be addressed suitably with –

- Engineering Control
- Management Control, and
- Personal Protective Equipment.

The safety representative of BA shall inform and educate for the identified risk and hazard control methods to employees, supervisor and engineer as well as the engineer in-charge and SAFETY group of TPCODL.

5.9 Safety Performance and Safety MIS: The BA shall maintain good practice of safety all through the contract duration. Safety shall always be of paramount importance during the contract period. Safety performance will be monitored on yearly basis throughout the period and no relaxation will be given for bad performance. BA with good track record and excellent performance will be rewarded suitably as per clause 6.0 of this document. The BA has to provide monthly "Performance Report – Safety" to engineer in-charge and SAFETY group TPCODL this shall be part of monthly bill along with training details. Performa of the report is enclosed as *annexure 9*.

5.10 Pre – Employment Medical Check-up and Fitness of employees engaged for the critical works: The BA shall submit the health fitness certificate for all those workers involved in climbing the pole or working at height for following diseases:

5.10.2 Epilepsy

5.10.3 Colour blindness
5.10.4 Deafness
5.10.5 Vertigo & height phobia

Every year BA will give an undertaking stating that all the employees are fit to work and have not developed aforesaid diseases. The Record of such medical check-ups shall be submitted to BA Cell before issue of temporary identity card. The records shall be maintained at BA Cell. All such medical check-ups shall be repeated once in a year for all workers involved in climbing the pole or working on electrical network.

6. REWARD AND PUNITIVE MEASURES

6.1 To support the enforcement of good SHE & DM practices by the Business Associate and to eliminate repeated or continuing safety violations, use of appropriate reward and punitive measures shall be made. Each unsafe act or violation of the safety guidelines as described in the Safety Manual of the TPCODL will be audit criteria of this system. Broadly the measures identified are following:

6.1.1 Working without PPE/ Safety Gadgets
6.1.2 Working without proper tools and tackles, barricading, Poor condition of Crane / Hydra / Vehicle, using without certification / Licence, Incompetent driver/ Helper
6.1.3 Working without creation of effective safety zone
6.1.4 Improper Supervision at worksite, Lineman/ Supervisor working without competency
6.1.5 Working without adherence to PTW process or authorization/ not adherence to SOPs / W.I. of TPCODL.
6.1.6 Improper Working at height equal to or above 1.8 mtrs without taking proper fall protection measures/ Poor condition of Ladder

6.2 Measures of Reward and Punitive Measures

The Engineer In-Charge, NSO, SC, ASOs, CSI / SIs and SHE &DM group will conduct the surprise audits of the work / project and if any non-conformance is found the same will be booked and entered in the format “Safety Violation Record” *annexure 10*. The flow of the information is given below:

Safety Violation Escalation & Monitoring process	
Action	**Responsibility**
Safety Violation form has been filled and counter foil sent to SAFETY team for information. The main form is to be given to BA supervisor / Engineer in-charge. *(Automatically generated if Site audit done through Mobile App.)*	Engineer In-charge/ NSO / SC / SAFETY Group /CSI/ ASO/ Any authorised TPCODL official.
↓	
Entry of the violation in the master record and sending the information to concerned Manager, HoG, HoD, Head and Chief (O &S). *(Automatically generated if Site audit done through Mobile App.)*.	SAFETY Group
↓	
Forwarding the information Centralized Account Payable (CAPS) for amount deduction from the current bill of the BA,	Engineer In-charge

if any.	
↓	
HoG (Safety – II) & HoG (Safety & Quality – Commercial) and CAPS to generate the MIS of the violations and the amount deducted.	SAFETY Group
↓	
The pool of the amount generated after the deduction to be utilized in safety welfare of BA employees.	SAFETY Group with approval of CFO/Chief (O & S) /CEO&MD

The safety violations have been rated from 1 to 5 (figure 6.3) as per the gravity of the violation. If the same violation is repeated it may escalate into a higher penalty. If a particular Business Associate employee violates safety norms three times, he shall not be allowed to work in TPCODL for a period of one year from the date of the 3rd violation.

6.3 Safety Violation Escalation Matrix

6.3.1

Consequence of Safety Violation Observed (Not related to Incident/ Accident)		Violation				
S.No.	Safety Violation	1st	2nd	3rd	4th	Subsequent Violations
1	Working without PPE (Helmet/Gloves/Safety Harness/ Safety Shoes etc.)	A	B	C	D	Will attract the same penality as applicable in the 4th violation.
2	Improper Working at Height	A	B	C	D	
3	Working without proper tools and tackles	A	B	C	D	
4	Poor condition of Crane/Hydra/ Vehicle/Incompetent driver/ Helper	A	B	C	D	
5	Violation of SOP/ WI	B	C	D	E	
6	Working without adherence to PTW process or authorization/ Safety Zone	C	D	E		

Legend	Action to be taken	Responsibility	Penality Amount (in Rs.)	
A	Warning letter	Engineer Incharge	Nil	The number of violations are to be calculated cumulatively over the contract period and not on monthly basis.
B	Levy of Penalty	Engineer Incharge	2,000	
C	Memo to BA & Levy of Penalty	Head of Group	4,000	
D	Memo to BA & Levy of Penalty	Head of Department	10,000	
E	Memo to BA, Levy of Penalty and termination of Contract	Head of Department	1,00,000	

Figure 6.3 (1a)-Penality Matrix for Safety violation (Applicable for Minor Contracts)

Consequence of Safety Violation Observed (Not related to Incident/ Accident)		Violation				
S.No.	Safety Violation	1st	2nd	3rd	4th	Subsequent Violations
1	Working without PPE (Helmet/Gloves/Safety Harness/ Safety Shoes etc.)	B	C	D	D	Will attract the same penality as applicable in the 4th violation.
2	Improper Working at Height	B	C	D	D	
3	Working without proper tools and tackles	A	B	C	D	
4	Poor condition of Crane/Hydra/ Vehicle/Incompetent driver/ Helper	B	C	D	E	
5	Violation of SOP/ WI	C	D	E		
6	Working without adherence to PTW process or authorization/ Safety Zone	C	D	E		

Legend	Action to be taken	Responsibility	Penality Amount (in Rs.)	
A	Levy of Penalty	Engineer Incharge	5,000	The number of violations are to be calculated cumulatively over the contract period and not on monthly basis.
B	Memo to BA & Levy of Penalty	Engineer Incharge	10,000	
C	Memo to BA & Levy of Penalty	Head of Group	25,000	
D	Memo to BA & Levy of Penalty	Head of Department	50,000	
E	Memo to BA, Levy of Penalty and termination of Contract	Head of Department	1,00,000	

Figure 6.3 (1b)-Penality Matrix for Safety violation (Applicable for Major Contracts)

Once the BA reaches the "BLACK" (color – "5") category, i.e. highest level of safety violation, "Termination" notice to BA will be issued from the office of the Head of Department (equivalent to GM/ Sr. GM level) and further, *if required,* continuation / extension of contract will only be initiated by Functional Chief / Head of the department (equivalent to Sr. GM / Chief level) and approved by CEO & MD. Till the extension, the contract will remain suspended.

TPCODL encourages the reportage of the safety violation during the contract work by BA. Any TPCODL employee can register a safety violation against the BA in the "Safety Violation Form" *annexure 10*. Initially the observer has to fill the form and handover the counterfoil (lower portion) of the document to the supervisor of the BA, inform the site engineer of TPCODL and send the top portion of the Safety Violation Form to SAFETY group for the further necessary action against the BA. ***The cumulative nos. of Safety Violations pertaining to any particular BA shall be calculated on yearly basis.***

Safety violations resulting in incident / accident will be treated as per gravity of the injury / fatality and its impact as well as type i.e. minor or Major. Consequences of incident / accident are shown in the matrix (figure 6.3(2) for major and 6.3(3) for minor) below. In case of any accident, findings and recommendations of Accident Enquiry Committee will be final and binding and will supersede the arbitration clause of GCC.

Consequence Of an Incident / Accident (In case of MAJOR contract)		Incident / Accident				Action Required
Sl. No	Type of the injury	1st	2nd	3rd	4th	
1	Slight injury (First Aid Case)	F (Strengthening of process through continuous improvement in the work procedure)				Take risk reduction measures
2	Minor injury (No or Hospitalization less then 48 Hrs)	F	G	G	H	
3	Major injury (Bone injury or burn or Hospitalization more then 48 Hrs)	G	G	H	I	
4	Single fatality	J	K			Intolerable
5	Multiple fatalities (Two or more fatalities during one event)	K				

Legend	Action to be taken	Responsibility	Penalty (in Rs.)	
F	Memo to BA and levy of penalty	Engineer Incharge	5,000/-	*The number of violations are to be calculated cumulatively over the contract period and not on monthly basis.*
G	Memo to BA and levy of penalty	Head of Group	20,000/-	
H	Memo to BA and levy of penalty	Head of Group	50,000/-	
I	Memo to BA and levy of penalty	Head of Department	2,00,000/-	
J	Memo to BA and levy of penalty	Head of Department	5,00,000/-.	
K	Memo to BA, levy of penalty, termination of contract and black listing of BA	Functional Head	10,00,000/-	

Figure 6.3 (2) - Penalty Matrix for Incident / Accident in Major Contracts

(*For example: In major contracts, if there is first incidence of major injury say bone injury (Cat. 3) where worker was hospitalized for more than 48 hrs then a penalty of amount Rs.20000/- will be deducted from the current bill produced for the payment. This penalty will be similar for first two incidents. However, it will increment to next higher category i.e. Rs. 50,000/- on subsequent incidents as per the above matrix)*

Consequence Of an Incident / Accident (In case of MINOR contract)		Incident / Accident				Action Required
Sl. No	Type of the injury	1st	2nd	3rd	4th	
1	Slight injury (First Aid Case)	L (Strengthening of process through continuous improvement in the work procedure)				Take risk reduction measures
2	Minor injury (No or Hospitalization less then 48 Hrs)	L	M	M	N	
3	Major injury (Bone injury or burn or Hospitalization more then 48 Hrs)	M	M	N	O	
4	Single fatality	P	Q			Intolerable
5	Multiple fatalities (Two or more fatalities during one event)	Q				

Legend	Action to be taken	Responsibility	Penalty (in Rs.)	
L	Memo to BA and levy of penalty	Engineer Incharge	5,000/-	*The number of violations are to be calculated cumulatively over the contract period and not on monthly basis.*
M	Memo to BA and levy of penalty	Engineer Incharge	10,000/-	
N	Memo to BA and levy of penalty	Head of Group	25,000/-	
O	Memo to BA and levy of penalty	Head of Department	1,00,000/-	
P	Memo to BA and levy of penalty	Head of Department	3,00,000/-.	
Q	Memo to BA, levy of penalty, termination of contract and black listing of the BA	Functional Head	5,00,000/-	

Figure 6.3 (3) - Penalty Matrix for Incident / Accident in Minor Contracts

(*For example: In minor contracts, if a worker meets with a non-fatal accident say bone injury (Cat. 3) where he was hospitalized for more than 48 hrs then a penalty of amount Rs. 10,000/-, will be charged from the current bill produced for the payment. This penalty will be similar for first two incidents. However, it will increment to next higher category i.e. Rs. 25,000/- on subsequent incidents as per the above matrix.)*

In case of single or multiple fatalities described under legends J&K of 6.3(2) and P&Q of 6.3(3), the concerned BA may be debarred from extension of contract or participate in new contract. In such event the approval of Chief (O & S) will be necessary for extension or award of new contract to concerned BA.

6.3.2 COMPENSATION FOR BA PERSONNEL

In the event of any untoward incident/ accident, the Business Associate shall ensure prompt medical assistance such as treatment, sickness benefit, etc. is provided to the victim(s) as per the Employees' Compensation Act, 1923 or Employees' State Insurance Act, 1948, as applicable. Also, the BA will be required to take adequate measures for compensating the victim(s) or his/her/their kin as follows:

I. <u>For Death or Permanent / Total Disablement</u>

The BA shall take an insurance coverage of at least Rs. 15 lakhs for each engaged employee, to cover any incidence of Death or Permanent / Total Disablement (Permanent/Total Disability shall be considered as defined under Employees' Compensation Act, 1923). In the event of any such unfortunate incident, the BA would ensure that adequate compensation is paid immediately to the family of the victim(s) from his own resources. This compensation shall be covered under the insurance policy subscribed by the BA mentioned earlier and the arrangement should be such that it would get reimbursed to the BA by the insurance agency subsequently.

II. For Permanent Partial Disablement and Temporary Total Disablement

The compensation in this case will be as per provisions of the Employees' Compensation Act, 1923 or Employees' State Insurance Act, 1948, as applicable.

Accordingly, the BA shall obtain a suitable Insurance Policy on award of Contract and submit documentary evidence of the policy to the BA Cell before commencement of work. The BA shall ensure that the Insurance policy is active at all times and all employees are covered in all respects till the conclusion of contract period or till working with TPCODL. The BA shall submit a copy of the policy after periodic renewals to the BA Cell.

However, on occurrence of such unfortunate incident, if it is found that the victim(s) is/are not covered under any insurance policy, the BA shall be liable to pay the entire sum of Rs. 10 lakhs from his own resources.

Further, in case of an accident resulting in Death or Permanent / Total Disablement while on duty, the appointed BA Nodal Officer will ensure that the BA complies with all statutory provisions and benefits i.e. PF, Compensation, Gratuity etc., and that all these are made available to the employees' nominee(s) as per the stipulated timelines.

6.3.3 TPCODL rewards the BA with good track record of safety management. It is proposed that BA complying with Contractors Safety Management, Safety Manual and Safety process will be rewarded suitably as per the procedure, rule and regulations of the TPCODL. In any case major accident is reported during an assessment period BA will not be eligible for this reward scheme. Assessment of contracts will be once in year. Generally the assessment cycle is calendar year and guidelines will be declared time to time.

Abbreviations Used in the Document

TPCODL	TP Central Odisha Distribution Limited
BA	Business Associate
HIRA	Hazard Identification & Risk Assessment
JSA	Job Safety Analysis
EHV	Extra High Voltage
SAFETY	Safety, Occupation Health, Environment & Disaster Management
MMG	Meter Management Group
EAG	Energy Audit Group
PPE	Personal Protective Equipment
SOP	Standard Operating Procedures
CSI/SI	Circle Safety In-charge / Safety In-charge
ASO	Area Safety Officer
NSO	Nodal Safety Officer
SC	Safety Coordinator
HoG / HoD	Head of Group / Head of Department
AGM / GM / VP	Assistant General Manager / General Manager / Vice President

CFO / Chief (O & S)/ CEO & MD	Chief Finance Officer / Chief (Operating & Safety) / Chief Executive Officer & Managing Director
COS	Corporate Operation Services
CAP	Centralized Account Payable System
PTW	Permit To Work
GCC	General Conditions of Contract.

- END -

Annexure 1 (Refer Para 3.1)

Business Associate Safety Management System Questionnaire

	Certification			
	The information provided in this questionnaire is a summary of the company's occupational health and safety management system.			
	Company Name:			
Turnover and experience:			Name of top officer:	
Date:			Position	
	Contract Details			
Contract Name			Contract Number:	

Business Associates Safety Management System Questionnaire	Marks	Yes	No	Score achieved
Safety Policy and Management				
- **Is there a written company Safety policy?** - If yes provide a copy of the policy, if No please refer Note 1.	1			
- **Does the company have an Safety Management system** - If yes provide details, if No please refer Note 1.	1			
- **Is there a company Safety Management System manual or plan?** - If yes provide a copy of the content page(s), if No please refer Note 1.	2			
- **Are Safety and occupational health responsibilities clearly identified for all levels of Management and staff?** - If yes provide details, if No please refer Note 1.	2			
Safe Work Practices and Procedures				
- **Has the company prepared safe operating procedures or specific safety instructions relevant to its operations and relevant work as per contract?** - If yes provide a summary listing of procedures or instructions, if No please refer Note 2.	1			

Certification				
- Comments				
- **Is there a register of injury or accident?** - If yes provide a copy (format)	1			
- **Is there a documented incident or accident investigation procedure?** - If yes provide a copy of a standard incident report form, if No please refer Note 2. - Comments	1			
Safety Training				
- **Describe how occupational health and safety training is conducted in your company** If No please refer Note 1.	2			
- **Is a record maintained of all training and induction programs undertaken for employees in your company?** - If yes provide examples of safety training records, if No please refer Note 2.	1			
- **Are regular safety inspections / audits are undertaken at worksites?** -If yes provide details (formats), if No please refer Note 3.	1			
- **Is there a procedure by which employees can report hazards at workplaces?** - If yes provide details if No please refer Note 1.	1			
Safety Monitoring				
- **Is there an officer / supervisor responsible for monitoring workplace / worksite safety?**	1			

Certification				
- If yes provide details				
Safety Performance Monitoring				
- **Are employees regularly provided with information on company health and safety performance?** - If yes provide details	1			
- **Has the company ever been convicted of an occupational health and safety offence?** - If yes provide details	NO Marks *(Negative mark ONE for each case)*			
- Has there been any major accident of employee at TPCODL site in past	NO Marks *(Negative mark ONE for each case*			
- Has there been any fatal accident of employee at TPCODL site in past. - (Note: Bid evaluation committee has to take cognizance of the incident and shall evaluate the bid only after formal approval of competent authority i.e. CTO. - In case of yes please refer Note 4.	NO Mark (Negative mark FIVE for each case)			
Minimum of 75% marks is required for qualification.		Total Marks achieved		
Company Reference				
1. Name of company *2. Name of company*				

Note

1: If company does not have formal procedure on Safety Management System than vendor may submit proposed Safety road map along with safety action plan and brief safety policy on his letter head signed by head of the organization.

2: The vendor may submit the same in the Safety Action Plan.

3: The vendor may utilize the same format of TPCODL or on request SAFETY group will assist the vendor in developing the audit system. For other points also vendor may take the assistance of SAFETY group for development of Safety management system.

4: The vendor may submit the Safety Improvement Plan and Safety Action Plan for his employees based on following points.

i. *Action plan for enhancing safety awareness*
ii. *Action plan for safety training of employee*
iii. *Action plan for increasing safety audit in field*
iv. *Action plan for provision and utilization of safety PPE.*
v. *Action plan for fatality reduction.*
vi. *Action plan for enhanced supervision at site*
vii. *Action plan for making employee more responsible and accountable for safety.*
viii. *Action plan for availability and utilization of all required tool and equipment.*
ix. *Safety Improvement done in last two years, specially highlighting those which have been taken after the fatal accident along with results.*
x. *Safety initiatives planed or started recently.*
xi. *Any other point.*

Based on above points and documentary evidences vendor will be required to submit a detailed report in support of his bid. The bid evaluation committee and competent authority will scrutinize the facts and the evidence submitted. If found satisfactory competent authority i.e. CTO may accord his approval for bid opening otherwise his tender shall be disqualified.

Annexure 2 (Refer Para 3.2 and 5.8)

Risk Assessment Form

Business Associate:
Scope of the work:
BA's Representative:
Telephone:
Signature: Date:

Specific Task/Activity	Potential Hazards/Consequences	Class of Risk	Control Measures
Working at Height	Fall from height	2	1. Mandatory usage of JSA checklist prior to start of work 2. Use appropriate ladder 3. Use full body safety harness having double lanyard. 4. Use Electrical Safety Shoes if working on electrical network otherwise use safety shoes. 5. Use Safety helmet. 6. Use PPE as per the annexure 7 of this CSM document 7. Refer Work instruction related to Working at Height for other details 8. Use of metal scaffold to be ensured in height work (cup lock type) 9. Deploy competent workforce who are medically fit

Specific Task/Activity	Potential Hazards/Consequences	Class of Risk	Control Measures
Working on electrical equipment / network	Electric flash / electrocution	3	1. Mandatory usage of JSA checklist prior to start of work 2. Use Electrical Safety Shoes while working on electrical network. 3. Use Electrical Safety gloves of appropriate voltage rating. 4. Use face shield / visor attached with helmet. 5. Use Safety helmet. 6. Use PPE as per the annexure 7 of this CSM document 7. Mandatory usage of Insulated tools & tackles on electrical system 8. Mandatory compliance for Lock Out & Tag out system. Refer Work instruction related to Working on electrical equipment / network for other details
Excavation / Civil work	Collapse of soil, Fall in excavated pit leading to Injury	2	1. Use safety shoes. 2. Use Safety helmet. 3. Use PPE as per the annexure 7 of this CSM document 4. Hard Barricading of the worksite. 5. Refer Work instruction related to excavation / civil work for other details
Material lifting & Mechanical Erection work	Fall of material/object, Topple of crane,	2	1. Mandatory compliance of crane checklist 2. Visual condition check of lifting tools and tackles such as wire rope sling,belt sling, chain, pulley block, D-shackles, etc. shall be ensured. 3. The operator's physical fitness and alertness should be judged by sup. / EIC. 4. Use PPE as per the annexure 7 of this CSM document 5. Refer Work instruction related to Material lifting & Mechanical Erection work
Road Safety	Road Accidents	3	1. Mandatory compliance of TPCODL Road Safety policy W07(COR-P-12)

Specific Task/Activity	Potential Hazards/Consequences	Class of Risk	Control Measures
Note: This information for the general indication purpose. The detailed risk assessment shall be conducted before start of the work by the authorized representative of the BA. The report of same shall be submitted to engineer in-charge along with annexure 4 of the CSM document.			

Guidelines for filling the Risk Assessment Form

- *Specific Task/Activity* - The documentation of each major task associated with the contract.
- *Potential Hazards* - The identification of hazards associated with each activity or task to be carried out.
- *Class of Risk* - Each hazard should be evaluated as a level of risk, described as Risk Class 1, 2 or 3 defined above.
- *Control Measure* - The identification and documentation of actions required to eliminate or reduce the hazards that could lead to accident or injury.

Hazard / Risks shall be classified according to the following schedule:

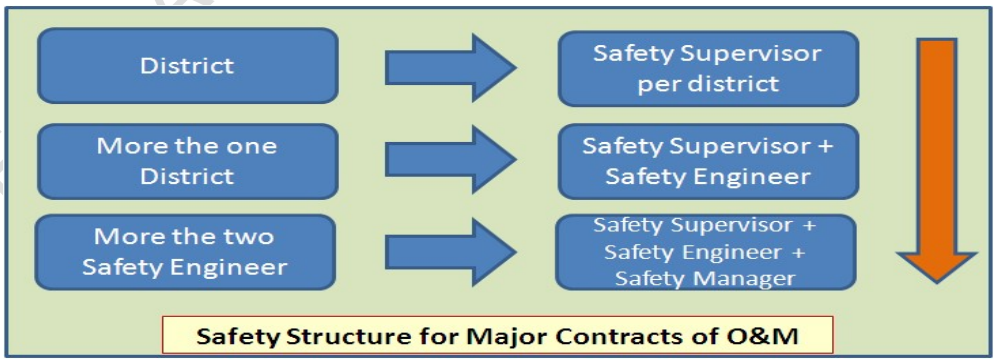
- Class 1: Potential to cause injury treatable with first aid
- Class 2: Potential to cause death or permanent injury
- Class 3: Potential to cause more than one or more lost time injuries.

Annexure 3.1 *(Refer Para 4.0)*

General Safety Conditions for the Maintenance of Distribution Network Contracts:

A BA awarded a contract (O&M) work of maintenance of distribution network will be required to fulfil the following conditions:

- BA shall provide Safety Policy and safety objectives of their company.
- BA shall comply with all statutory requirements like: applicable acts, regulations, codes of practice, OHSAS Standards, etc.
- BA shall provide the filled safety management questionnaire as per Annexure 1
- BA shall conduct a job risk assessment and provide information as per Annexure 2
- BA shall abide by Safety manuals, guidelines of TPCODL.
- BA shall provide its organisation structure & responsibilities in terms of Safety Management to TPCODL.
- BA shall document the work practices and procedures in terms of Safety Management.
- BA shall ensure safety training and induction program for the employees
- BA shall conduct safety audits & inspections as per TPCODL procedures provided by SAFETY group.
- BA shall provide and ensure the proper usage of the safety equipment (PPE) as per the TPCODL approved list in *annexure 7.*
- BA shall ensure periodic inspection of PPE to ensure its serviceability as per the specification given by TPCODL.
- BA shall ensure the adherence to standard operating procedures or guidelines laid down by TPCODL.
- BA shall ensure reporting of any unsafe act, unsafe conditions, near miss, incident or accident to engineer in-charge and SAFETY team of TPCODL.
- BA shall provide safety performance and Safety MIS (*annexure 9)* to engineer in-charge and SAFETY group periodically. Based on any non-confirmation to the safety procedures and guidelines, BA is liable to be negatively marked for his performance and suitable penalty will be imposed.
- BA shall ensure to depute a Safety Supervisor for managing a complete safety management system in a district. In case the BA has been awarded work in more than one district, then the following safety structure will be adopted.

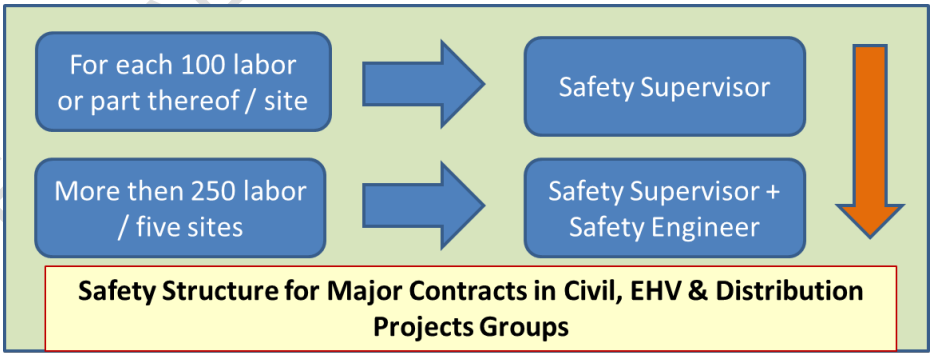


Annexure 3.2 ***(Refer Para 4.0)***

General Safety Conditions for the Distribution Projects Major Contracts:

A BA awarded a major contract work of TS&P in area of a circle will be required to fulfil the following conditions:

- BA shall provide Safety Policy and safety objectives of their company.
- BA shall comply with all statutory requirements like: applicable acts, regulations, codes of practice, OHSAS Standards, etc.
- BA shall provide the filled safety management questionnaire as per Annexure 1.
- BA shall conduct a job risk assessment and provide information as per Annexure 2
- BA shall abide by Safety manuals, guidelines of TPCODL.
- BA shall provide its organisation structure & responsibilities in terms of Safety Management to TPCODL.
- BA shall document the work practices and procedures in terms of Safety Management.
- BA shall ensure safety training and induction program for the employees
- BA shall conduct safety audits & inspections as per TPCODL procedures provided by SAFETY group.
- BA shall provide and ensure the proper usage of the safety equipment (PPE) as per the TPCODL approved list in annexure 7.
- BA shall ensure periodic inspection of PPE to ensure its serviceability as per the specification given by TPCODL.
- BA shall ensure the adherence to standard operating procedures or guidelines laid down by TPCODL.
- BA shall ensure reporting of any unsafe act, unsafe conditions, near miss, incident or accident to engineer in-charge and SAFETY team of TPCODL.
- BA shall provide safety performance and Safety MIS (*annexure 9)* to engineer in-charge and SAFETY group periodically. Based on any non-confirmation to the safety procedures and guidelines, BA is liable to be negatively marked for his performance and suitable penalty will be imposed.
- BA shall ensure to depute a Safety Supervisor for managing a complete safety management system in the area. In case the BA has been awarded work in more than one circle, then the following safety structure will be adopted.

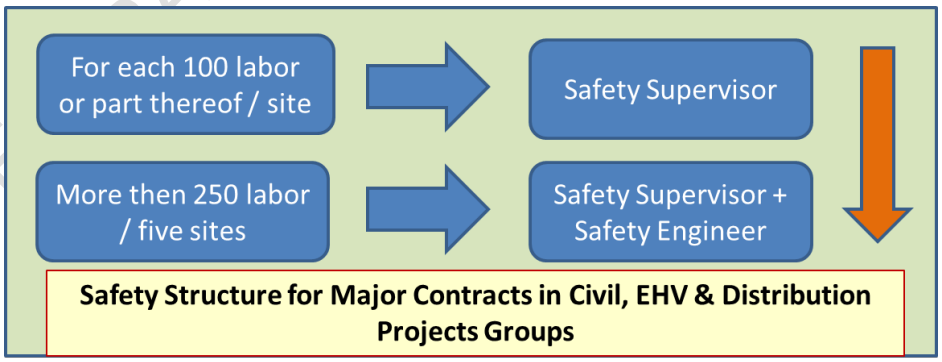


Annexure 3.3 ***(Refer Para 4.0)***

General Safety Conditions for the major EHV Projects Contracts:

A BA awarded a major contract work of EHV projects will be required to fulfil the following conditions:

- BA shall provide Safety Policy and safety objectives of their company.
- BA shall comply with all statutory requirements like: applicable acts, regulations, codes of practice, OHSAS Standards, etc.
- BA shall provide the filled safety management questionnaire as per Annexure 1
- BA shall conduct a job risk assessment and provide information as per Annexure 2
- BA shall abide by Safety manuals, guidelines of TPCODL.
- BA shall provide its organisation structure & responsibilities in terms of Safety Management to TPCODL.
- BA shall document the work practices and procedures in terms of Safety Management.
- BA shall ensure safety training and induction program for the employees
- BA shall conduct safety audits & inspections as per TPCODL procedures provided by SAFETY group.
- BA shall provide and ensure the proper usage of the safety equipment (PPE) as per the TPCODL approved list in annexure 7.
- BA shall ensure periodic inspection of PPE to ensure its serviceability as per the specification given by TPCODL.
- BA shall ensure the adherence to standard operating procedures or guidelines laid down by TPCODL.
- BA shall ensure reporting of any unsafe act, unsafe conditions, near miss, incident or accident to engineer in-charge and SAFETY team of TPCODL.
- BA shall provide safety performance and Safety MIS (*annexure 9)* to engineer in-charge and SAFETY group periodically. Based on any non-confirmation to the safety procedures and guidelines, BA is liable to be negatively marked for his performance and suitable penalty will be imposed.
- BA shall ensure to depute a Safety Supervisor for managing a complete safety management system in the area. In case the BA has been awarded work in more than one circle, then the following safety structure will be adopted.
- BA shall refer Construction Safety Manual in TPCODL Safety Manual for details.



Safety Structure for Major Contracts in Civil, EHV & Distribution Projects Groups

Annexure 3.4 ***(Refer Para 4.0)***

General Safety Conditions for the Maintenance of Sub – Transmission Network Contracts:

A BA awarded a major contract work of maintenance of sub – transmission network in area of a power system will be required to fulfil the following conditions:

- BA shall provide Safety Policy and safety objectives of their company.
- BA shall comply with all statutory requirements like: applicable acts, regulations, codes of practice, OHSAS Standards, etc.
- BA shall provide the filled safety management questionnaire as per Annexure 1
- BA shall conduct a job risk assessment and provide information as per Annexure 2
- BA shall abide by Safety manuals, guidelines of TPCODL.
- BA shall provide its organisation structure & responsibilities in terms of Safety Management to TPCODL.
- BA shall document the work practices and procedures in terms of Safety Management.
- BA shall ensure safety training and induction program for the employees
- BA shall conduct safety audits & inspections as per TPCODL procedures provided by SAFETY group.
- BA shall provide and ensure the proper usage of the safety equipment (PPE) as per the TPCODL approved list in annexure 7.
- BA shall ensure periodic inspection of PPE to ensure its serviceability as per the specification given by TPCODL.
- BA shall ensure the adherence to standard operating procedures or guidelines laid down by TPCODL.
- BA shall ensure reporting of any unsafe act, unsafe conditions, near miss, incident or accident to engineer in-charge and SAFETY team of TPCODL.
- BA shall provide safety performance and Safety MIS (*annexure 9)* to engineer in-charge and SAFETY group periodically. Based on any non-confirmation to the safety procedures and guidelines, BA is liable to be negatively marked for his performance and suitable penalty will be imposed.
- BA shall ensure to depute a Safety Coordinator for managing a complete safety management system in the area. In case the BA has been awarded work in more than one area power system, then the following safety structure will be adopted.

Annexure 3.5 ***(Refer Para 4.0)***

General Safety Conditions for the major contract work in Civil / Generation Projects:

A BA awarded a major contract work of / in civil or Generation project will be required to fulfil the following safety conditions:

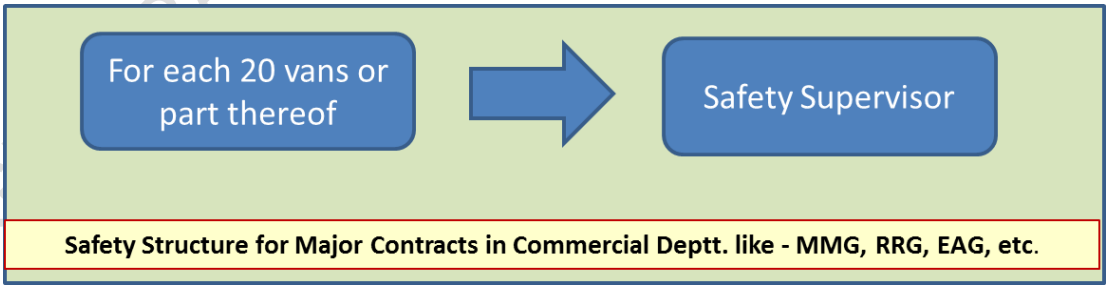
- BA shall provide Safety Policy and safety objectives of their company.
- BA shall comply with all statutory requirements like: applicable acts, regulations, codes of practice, OHSAS Standards, etc.
- BA shall provide the filled safety management questionnaire as per Annexure 1
- BA shall conduct a job risk assessment and provide information as per Annexure 2
- BA shall abide by Safety manuals, guidelines of TPCODL.
- BA shall provide its organisation structure & responsibilities in terms of Safety Management to TPCODL.
- BA shall document the work practices and procedures in terms of Safety Management.
- BA shall ensure safety training and induction program for the employees
- BA shall conduct safety audits & inspections as per TPCODL procedures provided by SAFETY group.
- BA shall provide and ensure the proper usage of the safety equipment (PPE) as per the TPCODL approved list in annexure 7.
- BA shall ensure periodic inspection of PPE to ensure its serviceability as per the specification given by TPCODL.
- BA shall ensure the adherence to standard operating procedures or guidelines laid down by TPCODL.
- BA shall ensure reporting of any unsafe act, unsafe conditions, near miss, incident or accident to engineer in-charge and SAFETY team of TPCODL.
- BA shall provide safety performance and Safety MIS (*annexure 9)* to engineer in-charge and SAFETY group periodically. Based on any non-confirmation to the safety procedures and guidelines, BA is liable to be negatively marked for his performance and suitable penalty will be imposed.
- BA shall ensure to depute a Safety Supervisor (for workforce upto 100 at site) / a safety engineer (for workforce upto 250 at site) / safety manager (for more than two safety engineers) for managing a complete safety management system at the project site. In case the BA has been awarded more than one major contracts, then the following safety structure will be adopted.
- BA shall refer Construction Safety Manual in TPCODL Safety Manual for details.

Annexure 3.6 ***(Refer Para 4.0)***

General Safety Conditions for the major contract work in Commercial Department like - MMG, RRG, EAG, etc.:

A BA awarded a major contract work in meter management group & energy auditing group will be required to fulfil the following safety conditions:

- BA shall provide Safety Policy and safety objectives of their company.
- BA shall comply with all statutory requirements like: applicable acts, regulations, codes of practice, OHSAS Standards, etc.
- BA shall provide the filled safety management questionnaire as per Annexure 1
- BA shall conduct a job risk assessment and provide information as per Annexure 2
- BA shall abide by Safety manuals, guidelines of TPCODL.
- BA shall provide its organisation structure & responsibilities in terms of Safety Management to TPCODL.
- BA shall document the work practices and procedures in terms of Safety Management.
- BA shall ensure safety training and induction program for the employees
- BA shall conduct safety audits & inspections as per TPCODL procedures provided by SAFETY group.
- BA shall provide and ensure the proper usage of the safety equipment (PPE) as per the TPCODL approved list in annexure 7.
- BA shall ensure periodic inspection of PPE to ensure its serviceability as per the specification given by TPCODL.
- BA shall ensure the adherence to standard operating procedures or guidelines laid down by TPCODL.
- BA shall ensure reporting of any unsafe act, unsafe conditions, near miss, incident or accident to engineer in-charge and SAFETY team of TPCODL.
- BA shall provide safety performance and Safety MIS (*annexure 9)* to engineer in-charge and SAFETY group periodically. Based on any non-confirmation to the safety procedures and guidelines, BA is liable to be negatively marked for his performance and suitable penalty will be imposed.
- BA shall ensure to depute a Safety Supervisor for managing a complete safety management system for the work as per the following safety structure.
- The BA for the RRG work shall depute one Safety supervisor.



Annexure 3.7 ***(Refer Para 4.0)***

General Safety Conditions for the major contract work in O&M of street light group:

A BA awarded a major contract work in operation and maintenance of street light group will be required to fulfil the following safety conditions:

- BA shall provide Safety Policy and safety objectives of their company.
- BA shall comply with all statutory requirements like: applicable acts, regulations, codes of practice, OHSAS Standards, etc.
- BA shall provide the filled safety management questionnaire as per Annexure 1
- BA shall conduct a job risk assessment and provide information as per Annexure 2
- BA shall abide by Safety manuals, guidelines of TPCODL.
- BA shall provide its organisation structure & responsibilities in terms of Safety Management to TPCODL.
- BA shall document the work practices and procedures in terms of Safety Management.
- BA shall ensure safety training and induction program for the employees
- BA shall conduct safety audits & inspections as per TPCODL procedures provided by SAFETY group.
- BA shall provide and ensure the proper usage of the safety equipment PPE as per the TPCODL approved list in annexure 7.
- BA shall ensure periodic inspection of PPE to ensure its serviceability as per the specification given by TPCODL.
- BA shall ensure the adherence to standard operating procedures or guidelines laid down by TPCODL.
- BA shall ensure reporting of any unsafe act, unsafe conditions, near miss, incident or accident to engineer in-charge and SAFETY team of TPCODL.
- BA shall provide safety performance and Safety MIS (*annexure 9)* to engineer in-charge and SAFETY group periodically. Based on any non-confirmation to the safety procedures and guidelines, BA is liable to be negatively marked for his performance and suitable penalty will be imposed.
- Each BA shall ensure to depute a Safety Supervisor for managing a complete safety management system for the work awarded as per the below structure.

Annexure 4 *(Refer Para 3.3)*

Safety Undertaking by way of Affidavit

I_____ s/o_____R/o_____ (AUTHORIZED REPRESENTATIVE/PARTNER/DIRECTOR/PROPRIETOR) of M/S _____(name of company/firm)__ having its office at (Complete address of Company), authorized vide power of attorney dated ------/Board resolution dated----/letter of authority dated----, hereinafter referred to as **Contractor [or Business Associate (BA)]** which expression shall, unless it be repugnant to or inconsistent with the meaning or context thereof, be deemed to include its heirs, executors, administrators, and assigns do hereby affirm and undertake as under :

1. The present undertaking shall remain in force from the date of execution of contract awarded by TPCODL and shall be valid till the date of termination of the said contract by either parties. The undertaking is binding on me (contractor) as well as my sub-contractor and its employees, representatives etc.
2. That I(the contractor) will be responsible and liable to comply and abide by all the safety rules, instructions and regulations as may be specified and laid down by The TP Central Odisha Distribution Limited (TPCODL) so as enable TPCODL to achieve its goal of Zero On site incidences.
3. That the Contractor shall be fully responsible for ensuring occupational health and safety of its employees, representatives, agents as well as of its subcontractor's employees, at all times during the discharge of their respective obligations under the contract including any methods adopted for performance of their tasks / work.
4. That Contractor shall ensure ,at its own expense to arrange for and procure, implement all requisite accident prevention tools, first aid boxes, personal protective equipment, fire extinguisher, safety training, Material Safety Data Sheet, pre-employment medical test, etc. for operations & activities including as & when so specified by TPCODL specifically. , failing which TPCODL shall be entitled, but not obliged, to provide the same and recover the actual cost thereof from the Contractor's payments.
5. That the Contractor shall engage adequate and competent Safety – Supervisor / Engineer / Manager / Skilled persons at site as per the Para 5 (Qualification and experience of safety personnel) and Annexure 3 of Contract Safety Management.
6. That the Contractor shall engage the competent Site – Supervisor with each group of workers for safe and correct workmanship, proper co-ordination of material and site work as per contract.

7. That the Contractor shall immediately replace supervisor in case it is found to be not up to the level of skill and experience required as in skill and experience required in *annexure 5* of this document, but any such replacement shall be only with the prior concurrence of TPCODL .
8. That the Contractor and its subcontractors shall abide by all the safety guidelines as per Safety Manual, Contract Safety Management and other guidelines issued from time to time by TPCODL during the contract period.
9. That in case the Contractor and/or any of its Subcontractor fail to ensure the compliance as required in terms of this undertaking the Contractor shall keep and hold TPCODL / its directors / officers / employees indemnified against any / all losses / damage / expense / liability / fines / compensation / claims / action / prosecutions or the like which might be suffered by TPCODL or to which TPCODL might get exposed to as a result of any breach /wilful negligence /deliberate default on the part of the Contractor /Subcontractor in complying with the same. Contractor shall also furnish any press release, clarification etc. if sought by TPCODL for any near miss or safety violations, accidents, which are attributable to fault of Contractor.

DEPONENT

VERIFICATION

Verified at Bhubaneswar on this _Day of _____20__ that the contents of the above affidavit are true and correct and nothing material has been concealed therefrom

DEPONENT

Annexure 5 *(Refer Para 5.4)*

SKILL / QUALIFICATION REQUIRED FOR ELECTRICIAN AND ELECTRICAL SUPERVISOR

Skill / Qualifications Required for Electrician *(Certificate of Competency Class-II)*:

1. Formal education in ITI – Wireman/ Electrician trade.

   OR

2. Working experience of minimum three years of practical wiring.

   OR

3. Have completed three years apprenticeship course through Apprenticeship Advisor, Govt. of Odisha / other state Govt. in the trade of Lineman / Wireman / Electrician.
4. A candidate must have attained the age of Eighteen years.

Skill / Qualifications Required for Electrical Supervisor (*Certificate of Competency Class-I)*:

1. Have at least five years' experience of practical wiring after passing the certificate of competency class-II i.e. electrician.

   OR

2. Recognized Degree or Diploma or equivalent qualification in Electrical Engineering from any Technical institute / College or University recognized by the Board.

   AND

   Must have completed the training/job in rectifying the common defects in electrical line and power installation for a period of one and three years after passing Degree or Diploma respectively

   OR

3. Possessing the valid certificate of certificate of competency class – 1 (Electrical Supervisor)

Annexure 6 (*Refer Para 5.6)*

Training Module for BAs Worker & Supervisor

Training for BA Supervisor **Duration – 02 Hrs / Month**

Methodology: **Lecture and Practical Demonstration of Safety Zone Creation**

Session: 1

Topic: **Electrical Safety Aspects**

Sub Topics:

1. Learning specifics of HT & LT Network of zone
2. Major type of HT / LT / service lines / street light maintenance works
3. Understanding the need of Safety
4. Understanding the safe process of maintenance :
    - Planning of the maintenance job
    - Availability of men, material & machine, PPEs, Safety gear and approved PTW
    - Briefing of the job by the supervisor of the TPCODL
    - Identification of Risks associated with the maintenance work and planning for controlling measures by TPCODL supervisor
    - Creation of safety zone by TPCODL supervisor and satisfying that the network is dead – Use of Neon Tester, Shorting Chain and Safety Tagging
    - Start of the work – Right person for the right job
    - Alert supervision
    - Completion of the job – Check points
    - Energization of network
    - Actions to be taken in case of some accident

Session: 2

Topic: **Use of Electrical Testing Equipment**

Methodology: **Lecture and Practical Demonstration**

Sub Topics:

1. Meggar, Hi Pot, Clamp On Meter, Neon Tester, Discharge Rod, Line tester etc.

Session: 3

Topic: **Awareness of Electrical Safety Aspects**

A. Understanding the need of this Training and Safety
B. Learning specifics of HT & LT Network
C. Major type of work to be carried out in zones
D. Switching Operations (Do's & Don'ts) including Street Light Switching
E. Working on Height *(practical demo also)*
F. Understanding the Safe Process of Maintenance / Working:
    - Planning of the job
    - Availability of men, material & machine, PPEs, Safety gear and approved PTW
    - Briefing of the job by the supervisor
    - Permit to Work
    - Safety Tagging and Lock Out Tag out

- Identification of Risks associated with the work to be carried out and planning for controlling measures by proper supervision
- Concept of "***Safety Zone***"
- Identification and use of Neon Tester, Shorting Chain, Clamp On Meter, Hi Pot, Meggar etc.
- Completion of the job – Check points
- Accident Theory & Incident Reporting
- Actions to be taken in case of some accident

Session: 4

Topic: Identification, Demonstration and Usages of Tools, PPEs and other Safety Gears and demonstration of working on HT pole

Session: 5

Topic: Practical demonstration of Safety Zone creation

FREQUENCY

Regular Safety Training Program

- It will be conducted for all field & supervisor staff of BA in such a manner that all BA Personnel attend at least two hours safety training during every month.

One Day Induction Safety Training Programs:

- This training will be for the new BA's personnel, who have been cleared by the Cross Functional Panel to undergo Safety training and who are likely to be deployed at various work sites of TPCODL by the BA, as a part of AMC / Work Contract.

Duration / Periodicity:

- Duration and periodicity has been defined above. However, this is subject to change at the discretion of TPCODL.

Annexure 7 *(Refer Para 5.7)*

LIST OF PERSONAL PROTECTIVE EQUIPMENT AND TESTING FREQUENCY

Sl. No.	Name of PPE	IS / EN Standard	Testing Frequency	Remarks	Ref Brand & Model
01	Leather Safety Shoes (Color – Black) with PU toe cap.	IS:15298 (Part-2)	Monthly and visual check every day for any crack or damage in the leather or sole.		BATA (Model No.- Endura L/C) Liberty (Model No. – 7198-01 HT Barton Black – Warrior)
02	HDPE Safety helmet with chin strap and ratchet type for adjustment.	IS:2925-1984	Monthly and visual check every day for any crack in shell.		Karam (PN Safetech) Joseph Leslie Accent Industries Honeywell
03	Full body harness (Safety belt)	EN 361	Monthly and visual check every day of the bends and the harness.		Karam (PN Safetech) Joseph Leslie Accent Industries
04	Electrical Safety Gloves	EN: 60903 CE marked	Weekly and visual check for any crack and blow test before every work.	Manufactured not beyond 12 months.	Make Sparian / Sumitech / CATU supplied with inner cotton glove with over glove of split leather.
05	Full face visor with safety helmet	EN: 166 CE marked (Visor)	Monthly and visual check every day for any crack in shell.	Clear acrylic visor attached with safety helmet.	Karam (PN Safetech) Joseph Leslie Accent Industries Honeywell
06	Fire Proof jacket for chest protection		Monthly and visual check every day.		
07	Safety Chain for shorting cum earthing.	As per TPCODL standard	Weekly and visual check before every work.	Made of brass, Total length – 5.5 meters and made of 12 SWG.	

Note:

1. *Any other Personal Protection Equipment required beyond above list will be according to BIS or EN Standards.*
2. *All Personal Protection Equipment will be checked by the engineer in-charge or SAFETY group of TPCODL.*
3. *Safety Representative of the BA has to maintain the record of the availability, condition and checking of the PPEs.*
4. *All tools required as per the contract must be according to respective IS / EN standards.*
5. *TPCODL may revise or add the above list of PPE and their specifications as and when feel necessary. The information about new specifications /models will be circulated by the Engineer In-charge (EIC), which shall adhere by the business associated in the shortest possible time. The EIC shall issue a memo / instruction to BA with timeline for implementation. Any delay will be treated as non- compliance / safety violations. Refer picture of each PPE given in next page.*

Pictures of PPE for reference purpose.

Sl. No.	Name of PPE	IS / EN Standard	Picture
01	Leather Safety Shoes (Color – Black) with PU toe cap.	IS:15298(Part-2) and with test report of electrical resistance.	
02	HDPE Safety helmet with chin strap and ratchet type for adjustment.	IS:2925-1984	
03	Full body harness (Safety belt) The straps at shoulder and thigh shall have full pad for comfort. The back shall be so designed that harness straps do not tangle with each other.	EN 361:2002 EN 358 : 2000 IS: 3521:1991/2002	

04	Electrical Safety Gloves – Composite type Soft electrical gloves as per size of individual.	EN: 60903 CE marked	
05	Full face visor with safety helmet	EN: 166 CE marked (Visor)	
06	Fire Proof jacket for chest protection		
07	Safety Chain for shorting cum earthing.	As per TPCODL standard	  
08	Reflective jacket to each workmen	As per TPCODL standard	

Note : Picture shown are for indicative purpose only. Actual product may differ.

Annexure 8 *(Refer Para 5.8)* LIST OF AUDITS TO BE CONDUCTED

Audits	Responsibility	Freq.	Ref. Doc.
Permit to Work & Field Audit	BA Safety Representative	Weekly	F04 (COR P - 12)
Tool Bag & PPE's Audit		Weekly	F06 (COR P - 12)
First Aid Box Maintenance Record		Fortnightly	F08 (COR P - 12)
Fire Extinguisher Record ***(Applicable for the BA involved in major construction works and have storage of flammable material at worksite)***		Monthly	F09 (COR P - 12)
Safety Talk Register		Weekly	F18 (COR P - 12)
Site Safety Audit		Daily	F29A (COR P - 12)

Note:

1. *(BA Safety Representative has to use the formats as per Safety process COR – P – 12 of TPCODL)*

Annexure 9 (*Refer Para 5.9)*

PERFORMANCE REPORT – SAFETY

FOR THE MONTH OF……

Name of BA : ……

Name of the Project and Purchase order No: ……

Date of commencement of work: ……

Man Hour Worked in this month (No. of employees X 8 Hrs + Overtime): ……

Cumulative Man Hour worked: ……

Total Number of Minor Injury (this month): …… Minor Injury (Total)……..

Major Injury (this month): …….. Major Injury (Total): ……

Detail of the Incident / Sub Standard Acts and Condition

Activity	This Month	Cumulative (Total)	Day Lost (this month)	Days Lost (Cumulative)
No. of the Incident				
No. of lost time injuries				
No. of dangerous occurrences				
No. of near miss reported				
Substandard Act/Conditions observed			Attach details of observation of this month	
Safety Violation Notice received (from TPCODL) (both in numbers and in Rs.)	No.	No.	No. of violation letter received and compliance report for the TPCODL.	
	Rs.	Rs.		

Note: Cumulative means total from date of commencement of work according to the contract.

Detail of the Accident / Near Miss Incidents:

Date and Time	Type of the incident	Name of Employee	Brief Description	Corrective and Preventive actions recommended

Details of the Safety Violations:

Date and Location	Brief Description	Name of employee involved	Action Taken

Detail of the Safety Talk / Tool Box Talk / Safety Training

Date and Location	Topic (s)	Total Number of employees (Worker / Supervisor)	Number of participants (Worker / Supervisor)

Detail of the Safety Meeting

Date and Location	Number of participants	Topics discussed	Major Observations / Innovation

Detail of the Safety Inspection /Audit: (as per TPCODL site audit checklist F29A(COR-P-12)

Date	Area / Location	Major Observations	Recommendations	Action Taken

Any other Safety, Occupational Health, Environment & Disaster Management Promotional Activity (During this month):

Date	Location	Activity	Level of Participation	Number of participation

Signature of the BA Safety Representative Signature of ZM / HoG

Name, E. No. and Date Name, E. No. Date.

Note: The original form to be deposited with Engineer in-charge and a copy to SAFETY group on or before 5th of every month along with bill. List of training of the current month and status of PPE to be also mentioned individual wise.

BA may include additional lines if required. The TPCODL may revise the format as and when deemed required.

ANNEXURE-M

VENDOR APPRAISAL FORM

TO BE SUBMITTED BY VENDOR (To be filled as applicable)			
VENDOR:			
1.0	**DETAILS OF THE FIRM**		
	1.1	NAME (IN CAPITAL LETTERS)	:
	1.2	TYPE OF CONCERN (PROPRIETORY) Partnership, Pvt. Ltd., Public Ltd. etc.	:
	1.3	YEAR OF ESTABLISHMENT	:
	1.4	LOCATION OF OFFICE POSTAL ADRESS TELEGRAPHIC ADDRESSES, TELEX NO. FAX NO.	:
	1.5	LOCATION OF MANUFACTURING UNITS	:
		i) UNITS 1	:
		ii) OTHER UNITS	:
2.0	**PRODUCTS MANUFACTURED**		:
3.0	**TURNOVER DURING THE LAST 3 YEARS (TO BE VERIFIED WITH THE LATEST PROFIT & LOSS STATEMENT).**		:
4.0	**VALUE OF FIXED ASSETS**		:
5.0	**NAME & ADDRESS OF THE BANKERS**		:
6.0	**BANK GUARANTEE LIMIT**		:
7.0	**CREDIT LIMIT**		:
8.0	**TECHNICAL**		
	8.1	NO.OF DESIGN ENGINEERS (INDICATE NO.OF YEARS EXPERIENCE IN RELATED FIELDS)	:
	8.2	NO.OF DRAUGHTSMEN	:
	8.3	COLLABORATION DETAILS (IF ANY)	:
		8.3.1 DATE OF COLLABORATION	:
		8.3.2 NAME OF COLLABORATOR	:

		8.3.3 RBI APPROVAL DETAILS	:
		8.3.4 EXPERIENCE LIST OF COLLABORATOR	:
		8.3.5 DURATION OF AGREEMENT	:
	8.4	AVAILABILITY OF STANDARDS / DESIGN PROCEDURES / COLLABORA-TOR'S / DOCUMENTS (CHECK WHETHER THESE ARE LATEST/CURRENT	:
	8.5	TECHNICAL SUPPORT, BACK-UP GUARANTEE, SUPERVISION, QUALITY CONTROL BY COLLABORATOR (WHEREVER ESSENTIAL). (THIS CLAUSE IS RELEVANT WHEN VENDOR'S EXPERIENCE IS INADEQUATE)	:
	8.6	QUALITY OF DRAWINGS	:
9.0	**MANUFACTURE**		
	9.1	SHOP SPACE, LAYOUT LIGHTING, VENTILATION, ETC.	:
	9.2	POWER (KVA)	:
		MAINS INSTALLED	:
		UTILISED	:
		STANDBY POWER SOURCE	:
	9.3	MANUFACTURING FACILITIES (ATTACH LIST OF EQUIPMENT AS APPLICABLE)	:
		9.3.1 MATERIAL HANDLING	:
		9.3.2 MACHINING	:
		9.3.3 FABRICATION	:
		9.3.4 HEAT TREATMENT	:
		9.3.5 BALANCING FACILITY	:
		9.3.6 SURFACE TREATMENT PRIOR TO PAINTING/ COATING, POLISHING, PICKLING, PASSIVATION, PAINTING, ETC.	:
	9.4	SUPERVISORY STAFF	:
	9.5	ADEQUACY OF SKILLED LABOURS (MACHINISTS, WELDERS, ETC.)	:
	9.6	NO. OF SHIFTS	:
	9.7	TYPE OF MATERIAL HANDLED (SUCH AS CS, SS, ETC.)	

	9.8	WORKMANSHIP	:
	9.9	MATERIAL IN STOCK AND VALUE	:
	9.10	TRANSPORT FACILITIES	:
	9.11	CARE IN HANDLING	:
10.0	**INSPECTION / QC / QA / TESTING**		
	10.1	NUMBER OF PERSONNEL (INDICATE NO.OF YEARS OF EXPERIENCE)	:
	10.2	INDEPENDENCE FROM PRODUCTION	:
	10.3	AVAILABILITY OF PROCEDURAL WRITE UP/QUALITY PLAN	:
	10.4	INCOMING MATERIAL CONTROL AND DOCUMENTATION	:
	10.5	RELIABILITY/REPUTATION OF SUPPLY SOURCES	:
	10.6	STAGE INSPECTION AND DOCUMENTATION	:
	10.7	SUB-ASSEMBLY & DOCUMENTATION	:
	10.8	FINAL INSPECTION AND DOCUMENTATION	:
	10.9	PREPARATION OF FINAL DOCUMENTATION PACKAGE	:
	10.10	TYPE TEST FACILITIES	:
	10.11	ACCEPTANCE TEST FACILITIES	:
	10.12	CALIBRATION OF INSTRUMENTS AND GAUGES (WITH TRACEABILITY TO NATIONAL STANDARDS) (ATTACH LIST)	:
	10.13	STATUTORY APPROVALS LIKE BIS, IBR, ETC.(AS APPLICABLE)	:
	10.14	SUB-VENDOR APPROVAL SYSTEM AND QUALITY CONTROL	:
	10.15	DETAILS OF TESTS CARRIED OUT AT INDEPENDENT RECOGNISED LABORATORIES	:
		i) FURNISH LIST OF TESTS CARRIED OUT AND THE NAME OF THE LABORATORY WHERE THE TESTS WERE CONDUCTED	:
		ii) CHECK AVAILABILITY OF CERTIFICATES AND REVIEW THESE WHEREVER POSSIBLE	:
11.0	**EXPERIENCE (INCLUDING CONSTRUCTION / ERECTION / COMMISSIONING) TO BE FURNISHED IN THE FORMAT INDICATED IN APPENDIX)**		:
12.0	**SALES, SERVICE AND SITE ORANISATIONAL DETAILS**		:

13.0	**CERTIFICATE FROM CUSTOMERS (ATTACH COPIES OF DOCUMENTS)**	:
14.0	**POWER SITUATION**	:
15.0	**LABOUR SITUATION**	:
16.0 *	**APPLICABILITY OF SC/ST RELAXATION (Y/N) IF YES, SUPPORTING DOCUMENTS TO BE ATTACHED**	
17.0	**ORGANIZATIONAL DETAILS** 1. PF NO 2. ESI NO 3. INSURANCE FOR WORK MAN COMPENSATION ACT NO 4. ELECTRICAL CONTRACT LIC NO 5. ITCC / PAN NO 6. SALES TAX NO 7. WC TAX REG. NO	:
18.0	**DOCUMENTS TO BE ENCLOSED:** 1. FACTORY LICENSE 2. ANNUAL REPORT FOR LAST THREE YEARS 3. TYPE TEST REPORT FOR THE ITEM 4. PAST EXPERIENCE REPORTS 5. ISO CERTIFICATE –QMS, EMS, OHAS, SA 6. REGISTRATION OF SALES TAX 7. COPY OF TIN NO. 8. COPY OF SERVICE TAX NO. 9. REGISTRATION OF CENTRAL EXCISE 10. COPY OF INCOME TAX CLEARANCE. 11. COPY OF PF REGISTRATION 12. COPY OF ESI REGISTRATION 13. COPY OF INSURANCE FOR WORK MAN COMPENSATION ACT NO 14. COPY OF ELECTRICAL CONTRACT LIC NO 15. COPY OF PAN NO 16. COPY OF WC TAX REGISTRATION 17. DOCUMENTS IN SUPPORT OF SC/ST RELAXATION AT S.NO.16.0 18. GST Registration No	

*** Classification of BA s under SC/ST shall be governed under following guidelines:**

- **Proprietorship/ Single Ownership Firm:** Proprietor of the firm should be from SC/ST community. Governing document shall be Proprietorship Deed.
- **Partnership Firm:** Only such firms shall qualify which have SC/ST partners holding equal to or more than 50% of the total ownership pattern of the firm. Governing document shall be Partnership Deed.
- **Private Limited Company:** Only such firms shall qualify which have SC/ST directors holding equal to or more than 50% of the total ownership pattern of the firm. Governing document shall be Memorandum of Understanding (MoU) and/or Article of Association (AoA).

NOTE: Certification from SC/ST Commission shall be required for deciding upon SC/ST status of a person.

ANNEXURE-N

MANUFACTURER AUTHORIZATION FORM

(To be submitted on OEM's Letter Head)

Date: …….

Tender Enquiry No.: ……..

To,

Chief (Procurement & Stores)

TP Central Odisha Distribution Limited,
Bhubaneswar

Sir,

WHEREAS M/s. *[name of OEM]*, who are official manufacturers of ……. having factories at *[address of OEM]* do hereby authorize M/s *[name of bidder]* to submit a Bid in relation to the Invitation for Bids indicated above, the purpose of which is to provide the following Goods, manufactured by us

……..

and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with the Special Conditions of Contract or as mentioned elsewhere in the Tender Document, with respect to the Goods offered by the above firm in reply to this Invitation for Bids.

We hereby confirm that in case, the channel partner fails to provide the necessary services as per the Tender Document referred above, M/s *[name of OEM]* shall provide standard warranty on the materials supplied against the contract. The warranty period and inclusion / exclusion of parts in the warranty shall remain same as defined in the contract issued to their channel partner against this tender enquiry.

Yours Sincerely,

For ……..

Authorized Signatory

Annexure VIII

Safety Policy and Safety Terms and Conditions

Contractor's Safety Code of Conduct

Reason for Change	Prepared By	Checked By	Approved by
Revision to accommodate Existing changes in org structure and to simplify the procedure	Rajesh Sharma *(Head-Safety Generation)*	Suresh Khetwani *(Chief - Safety & Environment)* Monish Kumar *(Chief -Corporate Contract)*	V. V. Namjoshi (Chief Generations)

INDEX

1. Objective

The Tata Power engages contractor workforce to execute, run and maintain various operating sites and facilities across locations for various business verticals including Generation, Transmission, Distribution and Renewable. The activities range from project execution, operation, maintenance to facilities management.

The management of contractor safety represents a significant challenge for management. Tata Power has a responsibility to ensure that contractors are provided with enough information and support to enable them to conduct their roles safely and without endangering health and safety of their own workforce or that of our staff.

To ensure reduction in reportable injuries and achieve goal of zero accidents, first edition of contractor safety code of conduct was launched successfully in the year 2014. Since last four years after the launch of CSCC, Tata Power could achieve the objective of reduction in reportable injuries and fatalities.

Over the period, as the system was being matured, a need was felt to make second revision of the CSCC process. Objective of second revision is improve existing CSCC system and make it user friendly.

2. Scope:

This procedure applies to all operating and project sites of The Tata Power Company Ltd and Group companies including new businesses like EV charging, Home Automation etc.

3. Definitions

3.1. **Order Manager:** Order Manager is the Tata Power representative, who has the ownership of the given job.

3.2. **Site Safety Management Plan**: It is the safety plan agreed between Contractor and Tata Power. It will contain the entire job specific safety requirement and will be signed by the contractor.

3.3. **Contractor**: An individual or a company that provides services to Tata Power under a signed contract.

3.4. **Emergency:** a serious, unexpected or dangerous situation requiring immediate action, which may result in loss of revenue/property, business discontinuity. In case of Emergency*, services may be procured by selecting the qualified vendor based on the vendor category without the safety bid evaluation. It must be approved by MB level and above.

3.5. **Expert Service jobs:** Jobs which needs expert services of contractor which does not involve direct exposure to the potential risk or work which involves only

supervisory work such as expert for turbine overhaul, expert for boiler overhaul, expert for pump and motor, expert for compressor overhaul.

3.6. **Head of the Division:** Business in charge of the division who is overall custodian of the generating station or transmission division or distribution division.

3.7. **Category A Vendor:** Vendor eligible to carry out Very High & High risk (as per Tata Power Hazard Identification and Risk Analysis Procedure) and /or Long-Term Contract related to operation and maintenance (O&M) of plant. Vendors must fulfil the requirement specified for Category A in Appendix 12-CSMF-5 of this document.

3.8. **Category B Vendor:** Vendors eligible to carry out technical jobs, that are classified under Medium /low risk. Vendors must fulfil the requirement specified for Category B in Appendix 12-CSMF-5 of this document.

3.9. **Category C Vendor:** Vendors eligible for to carry out low or very low risk administrative and office jobs. For this he must fulfil the requirement specified for Category C in Appendix 12-CSMF-5 of this document.

3.10. **Category D Vendor:** All Consultants, Medical Practitioners or vendors taking job from Tata Power and working from their own premises (e.g. motor rewinding at vendor's shop floor, equipment sent for repair to vendor's works etc.) are classified as Category D Vendor

3.11. **High Risk Jobs:** A Job or its activities are considered as Very High or High Risk when Order manager apply the "Tata Power Hazard Identification and Risk Analysis" procedure and found safety risk associated with are under Very High or High category. Indicative lists of jobs are given in appendix 15 of this document**.**

3.12. **Medium Risk Jobs:** Jobs or its activities are considered as medium risk when Order manager apply "Tata Power Hazard Identification and Risk Analysis" procedure and found the same as Medium Risk.

3.13. **Low Risk Jobs:** Any job or its activities are considered as Low or Very low risk while Order manager, calculate it by applying "Tata Power Hazard Identification and Risk Analysis" procedure and found it under Low or Very Low category.

3.14. **Long Duration Jobs:** When the duration of job is 12 months or more, it is considered as Long duration job

3.15. **High Value Jobs:** When the value of the job contract is Rs. One Crore or more it will be considered as High value job**.**

4. Responsibilities

4.1 Order Manager: Order Manager is the Tata Power representative, who is responsible for:

4.1.1 Finalizing the Site Safety Management Plan along with Contractor, Safety Concurrences Group, Divisional Safety Head and Expert (External or Internal) if required.

4.1.2 Supervise and ensure work is carried out as per the Site Safety Management Plan including agreed Risk Assessment (HIRA/JSA) and Method Statement.

4.1.3 Conduct audit and evaluate Safety Performance of contractor.

4.1.4 Ensure contractors adhere to all statutory provisions.

4.1.5 In case any deviation is needed in agreed safety management plan or in CSCC process for execution of job, Management of Change procedure will be applicable, and approval may be obtained from divisional head /Cluster head.

4.2 Contractor: The person, entity or organisation who is executing the job for Tata Power under a contractual agreement and will be responsible for the following

4.2.1 To follow all Tata Power Critical Safety Procedure, Rules and guidelines given in Safety Terms and Conditions

4.2.2 Undertake job as per Site Safety Management Plan CSM-F10 and method statements agreed with Tata Power.

4.2.3 Raise any concerns with regard to their work and its safety with the Tata Power Order Manager.

4.2.4 Report all injuries, near misses, unsafe acts/conditions, and occurrences to the Tata Power Order Manager immediately.

4.2.5 Ensure that all sub-contractors follow the Tata Power Safety Procedure and agreed Site Safety Management Plan CSM-F10.

4.2.6 To follow all statutory requirements as per the laws of the land.

4.2.7 All vendors applying for A category jobs or submitting quote for high risk jobs shall obtain certificates of ISO 9001, ISO14001 and ISO45001 before submitting quote for high risk Jobs.

4.3 Safety Concurrence Group: It is Cross Functional Team constituted by Corporate Safety Team, which will have representatives from Execution department, Divisional safety and Corporate / Divisional contracts. SCG will be responsible for the following

4.3.1 Assessment of Safety Potential of new vendor before registration as per CSM-F1-Safety Category Qualification Form.

4.3.2 Safety Evaluation of the bids as per evaluation format CSM-F-9 Safety Bid Evaluation Criteria

4.3.3 Finalization of the Site Safety Management Plan CSM-F-10 submitted by the contractor.

4.3.4 Corporate Safety Team / Cluster Safety Head will be part of SCG during Safety Bid Evaluation for following types of jobs

4.3.4.1 High-Risk jobs to be carried out in Annual Overhaul / Major Shutdowns and Outages.

4.3.4.2 Capex jobs of High-Risk Category

5.1 Vendor Registration

For Vendor Registration, Corporate Contract will issue following documents for evaluation of contractor's safety capability

1) CSM-F1 –Safety Category Qualification Form
2) Safety Terms and Conditions

The document Safety Terms and Conditions provides the information about Tata Power safety System to the contractor. Contractor will submit the CSM-F1- Safety Category Qualification Form with all relevant details and documents to Vendor Registration Initiator, which will in turn forward it to Safety Concurrence Group (SCG) for evaluation. The SCG will evaluate the details submitted by the contractor based on a predetermined criteria CSM-F-5 Safety Potential Evaluation Criteria for Vendor Registration and will determine the category (Category A/B/C/D) for which the contractor will be registered. As mentioned in the above criteria, a site visit may also be organized by SCG prior to registration under Category A and B. In case, the contractor does not qualify the safety criteria, the contractor will not be registered. However, he may apply afresh for registration after 6 months. Please refer Appendix 1: Process Flow Chart for Vendor Registration.

5.2 Bid evaluation

At the time of placing the Purchase Requisition (PR), Order Manager is required to declare the risk involved in the of the job (i.e. High Risk / Medium Risk / Low Risk jobs, based on the RPN in HIRA. If the Job is "High Risk" or "Long Duration", then RFQ will be attached with following documents:

1) CSM-F7- Blank Safety Competency Form
2) CSM-F8 PPE requirements
3) Safety Terms and Conditions
4) Job Specific Safety Requirement (Educational and Professional Qualification, Skill & Experience Manpower, Tools and Tackles (e.g. man lifter, use of drone, use & availability of rescue kit), Work Methodology etc.)

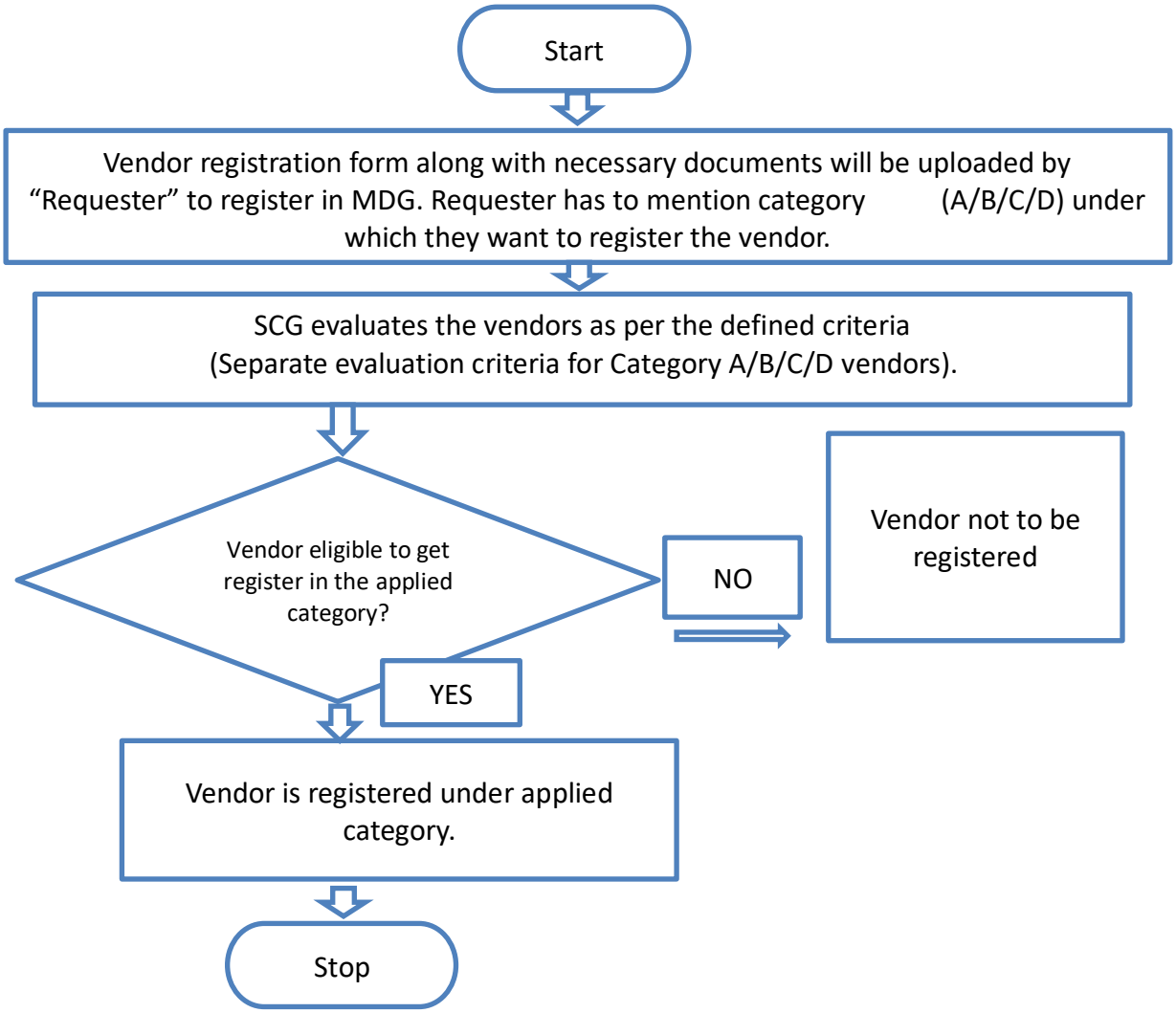
Otherwise the RFQ will be attached only with Safety Terms and Conditions. Long term and low value jobs (see definition) are exempted from the CSCC process.

Corporate Contracts will collect duly filledCSM-F7 Safety Competency Form along with the bid. All other stakeholders will also put their efforts to get all relevant safety data during meeting / discussions with the vendor. SCG will evaluate the document as per the CSM-F9 Safety bid evaluation criteria. If any specific condition related to Contract is required to convey to contractor, Site safety team will attach the same as Annexure for specific conditions of job and submit it to contract team along with safety bid evaluation form. Commercial bid of contractor will be considered for evaluation by contract team only if contractor is qualified in safety bid. Site Safety Management Plan, defining the complete procedure of executing the job at site will be signed by the contractor and SCG after mutual agreement. CC will attach a copy of site safety Management Plan and any specific condition of contract along with PO to the successful bidder. Please refer Appendix 6: Process Flow Chart for issuing RFQ and PO significant health and safety risk associated with it.

5.3 Safety Performance Evaluation

During the time of job execution, regular site inspection will be carried out by the Tata Power officials and violations will be dealt as per CSM–F4 Safety Violation Penalty Criteria. Apart from this, monthly safety performance of the contractor will be evaluated based on the predetermined criteria as per CSM-F11 safety Performance Score and monthly score will be maintained by the Order Manager. Certain percentage of each running bill will be retained as Safety Retention amount and will be released on the basis of Safety Performance Score at certain intervals as defined in CSM- F-3- Safety Performance Evaluation Criteria. Please refer Appendix 10: Process Flow Chart for Safety Performance Evaluation. Percentage of retention amount is mentioned in safety terms and conditions.

Appendix 1: Process Flow Chart for Vendor Registration



Appendix 2: CSM-F-1 Safety Category Qualification form

1. "**Safety Category Qualification Form**" is part of vendor registration form. It needs to be filled by the contractor at the time of Registration and should submitted to Requester / order manager with all relevant documents.
2. The same will be evaluated by Safety Concurrence Group of the Division (SCG) as per the criteria given in CSM-F-5.
3. Information provided by contractor will be verified during site visit.

Safety Category Qualification Form

Please Consider my application for

Category A Vendor: Vendor eligible to carry out Very High- and High-risk O&M jobs
Category B Vendor: Vendors eligible to carry out technical jobs, classified as Medium / low risk
Category C Vendor: Vendors eligible for to carry out low or very low risk administrative and office jobs
Category D vendor: All Consultants, Medical Practitioners or vendors taking job from Tata Power and working from their own premises.

<table>
<tr><td colspan="4">Name of the Vendor:</td></tr>
<tr><td>Sr. No</td><td>Safety Information</td><td>Remarks</td><td>Attachment</td></tr>
<tr><td>1</td><td>Certified for
i. OHSAS 18001/ ISO 45001,
ii. ISO: 14001
iii. ISO: 9001
(ISO certificates to be issued from reputed accreditation agencies specified by Tata Power)</td><td>i. Y/ N
ii. Y/ N
iii. Y/ N</td><td>Attach copy of the certification</td></tr>
<tr><td>2</td><td>Safety Statistics for Last Three (3) Years
- LTIFR
- LTISR</td><td>Yes/No</td><td><table><tr><td></td><td>Year 1 (Last FY)</td><td>Year 2</td><td>Year 3</td></tr><tr><td>LTIFR</td><td></td><td></td><td></td></tr><tr><td>LTISR</td><td></td><td></td><td></td></tr></table></td></tr>
<tr><td>3</td><td>Do you have Safety Policy?</td><td>Yes/No</td><td>Attach copy of the safety policy.</td></tr>
<tr><td>4</td><td>Do you have Safety training process?</td><td>Yes/No</td><td>Attach safety training process.</td></tr>
<tr><td>5</td><td>Do you have Safety organization structure e.g. Safety Officers and Safety Committees?</td><td>Yes/No</td><td>Attach copy of the safety organization structure.</td></tr>
<tr><td>6</td><td>Name and address of sites where work is in progress or worked earlier</td><td>Yes/No</td><td>Site details to be attached for inspection by Officials.</td></tr>
</table>

Signature :
Name and Designation :
Stamp of Organization :

Appendix 3: Safety Terms and Conditions

Please refer the attached document Safety Terms and Conditions.

Appendix 4: CSM- F-3- Safety Performance Evaluation Criteria

1. A certain percentage of the bill value will be retained against every running bill as safety performance retention. The amount will be released with the last invoice or every six-month based on Safety Performance Score of contractors. The retention amount will be calculated based on contract value as below.

Contract Value	Retention Amount (%)
Up to 10 Lakhs	2.5
10 – 50 lakhs	2
0.5 to 10 Cr	1.5
>10 Cr	1

2. The evaluation criteria include Lead Indicators such as CFSA (Contractor Field safety Audit) score, percentage of workers trained in TPSDI, inspection of critical equipment. Lag indicators such as Fatalities, LWDC and man days lost.
3. The retention amount saved will go to a separate Safety Improvement Fund.
4. For the contract value of more than Rs 1 Cr or contract duration more than 12 months, the retention amount shall be released half yearly based on safety performance. For all remaining contracts, the retention amount will be released with the final bill.
5. Long term jobs with low value (Less than Rs. 1 Cr.) are exempted from the safety retention. Invoice of these type of jobs can be cleared without safety retention.
6. In case of job stoppage due to safety violations / unsafe observations at the site, no time extension shall be given to the contractor, if such delays are attributable to contractor.
7. In case of fatality, limb loss or loss of property, vendor must pay for liability, legal, statutory and additional mutually agreed settlement charges imposed by the appointed committee. This charge is over and above the retention amount.
8. The committee will finalize an amount between 5 -50 lakhs based on factors such as advise by statutory authorities, contract value and impact of accident etc.
9. Safety performance bonus 1% (limiting to 50 lakhs) of the invoice value will be considered at the end of the job if the contractual safety performance score 100%.
10. During the progress of the work, concerned Supervisor/Engineer will visit and inspect the work site regularly and evaluate the safety performance of the contractor based on matrix attached herewith and apply the Consequence management policy as applicable.
11. Order Manager, divisional chief and SBU head have the authority to terminate the contract in case of three consecutive serious violations.

Safety Performance Evaluation report- CSM-F-3

	Lead Indicators	Unit Of measurement	Target	weight age
1	% of Employee certified in TPSDI/Authorized agency	%	50%	10
2	CFSA score (Annexure 6.1)	Average Severity of Violations	1.49	20
3	Monthly inspection completed by contractor for Critical Equipment, lifting Tools & Tackles and hand tools used at site as per Tata Power Checklist	%	80	5
4	Revalidation of Condition of tools, tackles and equipment by Order Manger.	%	100	15
	Lag Indicators			
1	Number of Fatalities	No.	0	30
2	Number of Lost workday case (LWDC)	No.	0	10
3	Man-days Lost	No.	0	10

Appendix 5: CSM- F-4 Safety Violation Penalty Criteria

Penalty shall be imposed on the contractors under the following circumstances for breaching the contractual agreements:

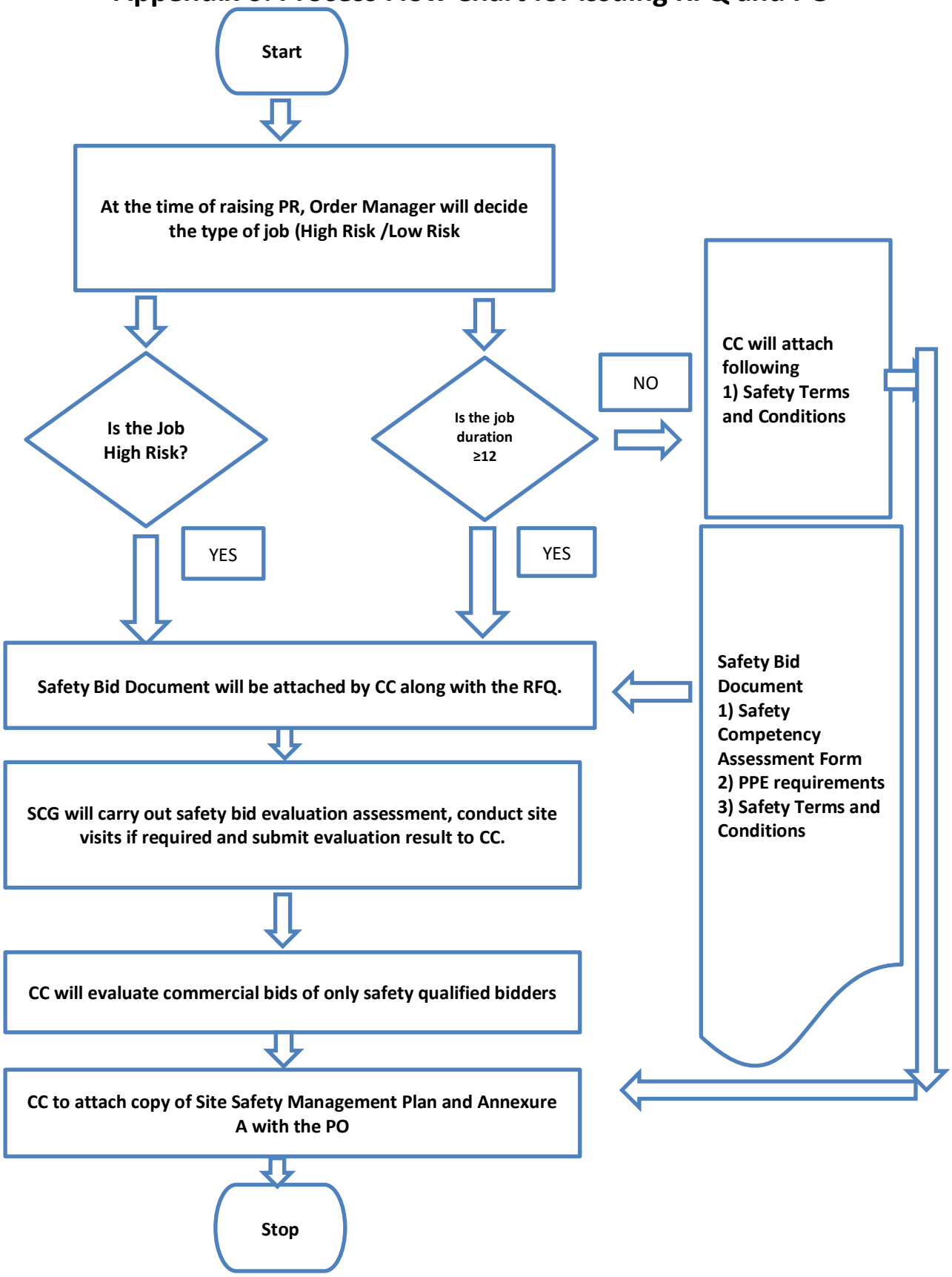
Sr No	Description of violation	Severity	Penalty
1.	Working without Permit	5	5000/-
2.	Untrained (TPSDI) worker on high-risk jobs.	5	5000/-
3.	Unhygienic/Bad condition of PPE	2	250/-
4.	Not following Tata Power Procedure & Standard	4	2000/-
5.	Unsafe Act/Condition of Severity 4	4	2000/-
6.	Unsafe Act/Condition of Severity 5	5	5000/-
7.	No Earthling of Electrical equipment	5	5000/-
8.	Damaged welding cable	5	5000/
9.	Violation of Positive Isolation Procedure (LOTO Not followed)	5	5000/
10.	ELCB of more than 30 mA/ELCB not working	5	5000/
11.	On/Off switch of welding m/c not working	5	5000/
12.	Electric cable tied with metal wire	5	5000/
13.	Leakage found DA hose / cylinder	5	5000/
14.	Use of LPG	5	5000/
15.	Use of IC engine based Three-wheeler at the work site.	5	5000/
16.	Starting the job without Toolbox Talk	5	5000/
17.	Spatter falling on DA hose / Gas-line/ pathways / Equipment	5	5000/
18.	No safety latch in crane hook	5	5000/
19.	Load raised or swung over people or occupied areas of buildings	5	5000/
20.	Persons standing in swing area of construction equipment.	5	5000/
21.	Using damaged slings.	5	5000/
22.	Unstable scaffolding/nonstandard Scaffolding in use	5	5000/
23.	Handrails and mid-rails are missing	5	5000/
24.	Safety Harness not anchored with lifeline/fixed structure	5	5000/
25.	Fall arrestor not provided/ Not being used.	5	5000/
26.	Double lifeline not used for working at height	5	5000/
27.	No rubber mat in Electrical Distribution (DB) room	4	2000/-
28.	Water found accumulated in Electrical Distribution room/near welding machine.	4	2000/
29.	Inserting electric cables into socket, without using plug.	4	2000/
30.	Use of damaged electrical cable/two core cables.	4	2000/
31.	Inflammable material found in Distribution Room / welding areas.	4	2000/
32.	Loose material falling into excavated pit	4	2000/
33.	Water logging into excavated pit /trenches	4	2000/

34.	No / inadequate Barricade	4	2000/
35.	Undercut / cave-in found on sides of excavated pits	4	2000/
36.	Grinding wheel/ Coupling/ Piling winch/other rotating parts without guard	4	2000/
37.	The HMV/Mobile Crane operator does not have a valid HMV driving license.	4	2000/
38.	The loading area is not leveled properly.	4	2000/
39.	Ladder not anchored at top	4	2000/
40.	Opening found in working platform of scaffolding/floor	4	2000/
41.	Inadequate illumination at the working area	4	2000/
42.	Loose material lying on Gantry, platform	4	2000/
43.	Cleaning with Compressed Air.	3	500/-
44.	Gas Cylinders using without cap.	3	500/
45.	Gas Cylinders stored without securing	3	500/
46.	Bringing inside any other chemicals, apart from approved by Safety dept.	3	500/
47.	Using drum for sitting or accessing height.	3	500/
48.	Misusing emergency facilities like fire hydrant line/ hose box/ spray system/ eye wash etc.	3	500/
49.	No provision of Safety net where falling materials or tools may occurs	3	500/
50.	Taking electrical supply from non-designated outlet (other than socket).	3	500/
51.	Restricted gangways due to unwanted materials.	3	500/
52.	Not reporting incident.	3	500/
53.	Entering into restricted area like switch yard/ hazardous storage	3	500/
54.	Work without supervision	3	500/
55.	Parking of vehicle without applying wheel choke at right front-front and left rear-rear wheels other than passenger cars.	3	500/
56.	Heavy Vehicle without helper or co-driver.	3	500/
57.	Not wearing florescent safety jacket at site.	3	500/
58.	People travelling in load body of vehicle.	3	500/
59.	Parking of vehicles at non designated area.	3	500/
60.	Shifting heavy materials without guide ropes.	3	500/
61.	Using other than 24V lamp inside the confined space/Use of other than 24V lamps.	3	500/
62.	Angular loading/ lifting with Crane or hoist.	3	500/
63.	By passing the limit switch/ Safety Interlock.	3	500/
64.	Housekeeping activities on road without proper barricade.	3	500/
65.	Trying to board or alit from running vehicle.	3	500/
66.	Cylinder Valves of Gas cylinders not closed when not in use.	3	500/
67.	Flash-back arrester not used.	3	500/

68.	Hand Trolley wheel found damaged.	3	500/
69.	Guy ropes of required length on both sides of object are not used during movement with load.	3	5/ 00/
70.	Scotch block/wedge not provided, when the vehicle is parked.	3	500/
71.	Suitable Trolley not provided to hold the cylinders.	3	500/
72.	Locked First Aid box	3	500/
73.	Caution boards, danger signs (luminescent /red) along with emergency contact number are not found displayed.	3	500/
74.	Person found jumping barricading tape	3	500/
75.	Stacking of pipes, pile casing, drums without chock blocks/wedges	3	500/
76.	The terrain on which Heavy Equipment/Machinery moves is not reasonably hard.	3	500/
77.	Without Safety Helmet at working sites	4	250/-
78.	Without Crash Helmet (on bikes)	4	500/-
79.	Without Full body double lanyard Safety Harness (for work at height)	5	5000/-
80.	Without Hand gloves - Material Handling, Welding, Cutting,	4	100/-
81.	Without Safety goggles/ face shield - Welding/Cutting /Grinding	5	5000/-
82.	Handling Chemical without PVC Apron	5	5000/-
83.	Smoking in prohibited area (Closed Go-downs, Storage of flammable material, Storage of Gas cylinders)	5	1000/-
84.	Sleeping at Workplace	3	100/-
85.	Driving beyond speed limit	3	1000/-
86.	Seat Belt While Driving (for front seat passengers and driver)	3	500/-
87.	Driving without license	4	1000/-
88.	Heavy Commercial vehicles without reverse horn	3	500/-
89.	Nonfunctional Head light/ taillight and side indicators	3	100/-
90.	Using Mobile Phone During Driving	5	5000/-
91.	Poor visibility of registration number/ without registration number	3	100/-
92.	Broken/ without Side view mirror	3	100/-
93.	Over speeding above specified limit	3	500/-
94.	Broken/ Without Pressure gauge on Oxygen/ LPG / Acetylene cylinder.	3	500/-
95.	Without Flash back arrestor on Industrial Acetylene & Oxygen cylinders.	5	5000/-
96.	Spillage of hazardous material/chemicals during transportation	4	2000/-
97.	Electrical equipment without Earthing/ ELCB/ Double Insulation Cable.	5	5000/-

98.	Lifting Tools & Tackles used without/ expired Test Certificates.	5	5000/-
99.	Housekeeping repeatedly not maintained		
100.	• First Time	3	Warning
101.	• Second Time	4	1000/-
102.	• Third Time	5	5000/-
103.	Serious Violation of House Keeping (after 1st or 2nd warning to be decided by Project Manager depending on the severity)	5	Rs.10000/- and above
104.	Repeat Violation of same nature	5	5 X Penalty for Violation
105.	Appointment of subcontractor without his Safety Bid Evaluation and/or without the permission of engineer in charge or Order manager.	5	5% of Contract Value

Appendix 6: Process Flow Chart for issuing RFQ and PO



Appendix 7: CSM-F-7 Safety Competency Form (Template)

Name of the Vendor/Bidder : -

Name of the Sub Vendor (If job is given to Sub Vendor) : -

Description of the Job : -

Request for Quotation (RFQ) No. :-

Vendor/Bidder to mandatorily provide the below safety competency related information.

1. Proposed Manpower Deployment Schedule : -

Category of Manpower Deployed	Minimum Qualification & Experience	Proposed Numbers against each category month-wise			
		Month 1	Month 2	…	Month n
Project Manager					
Site-In-Charge (Site Manager)					
Shift-in-Charge					
Safety Officers					
Supervisors					
Technicians					
a……					
b……					
Highly Skilled Workmen					
a……					
b……					
Skilled Workmen					
Semi-Skilled Workmen					
Unskilled Workmen					
Total Manpower					

Instructions to Bidder to fill:

1. Bidder to provide the overall site manpower deployment schedule as above.
2. Bidder to indicate (through colour code mentioned below) their direct and sub-contracted employees

Direct bidder employee
Partly Direct / Partly sub-contracted
Sub-Contracted

3. Against each of the category, bidder to indicate the minimum qualification and experience of the proposed manpower.
4. Rows can be added to also identify other specialised manpower e.g. specific details to be included for high risk activities operators
5. Columns can be extended to the actual duration of Site activities.
6. Bidder to note that if operations is in shifts, then Shift-in-charge / safety officers are required for each shift of operation.

2. List of Tools, Tackles, Machines and Equipment: -

Bidder/ Vendor to provide the list of tools, tackles, equipment **to be used during the job / project execution**. Bidder/Vendor to ensure that all the lifting tools and tackles, pressure vessels are duly certified by the competent person authorised by the Chief Inspector of Factories of the respective state prior to start of the job

Sr. No.	Description of Tools / Tackles	Capacity / Rating	Quantity	Make	Remarks
1					
2					
3					
4					
5					
6					
7					
...					

3. Safety Records:

Bidder to provide the details of fatalities and lost workday cases (LWDC), occurred in last three years (data to be provided for the last completed FY and preceding 2 years).

Description	Safety Data for Last 3 Years		
	Year 1 (Last FY)	Year 2	Year 3
	20__ - __	20__ - __	20__ - __
Fatalities (Nos.)			
Lost Workday Cases (Nos.)			

In case of no fatalities, LWDC during any year, the form may be filled stating NIL against the respective year. Bidders are encouraged to also submit the RCA / incident investigation reports and the learning's implemented out of the above reported incidents

4. Job Safety Plan/ Method Statement:

Bidder to provide / enclose a detailed Site/Job Safety Plan along with a Method statement detailing the execution philosophy (how the bidder intends to execute the Job/Project), identifying all key activities which are required to be performed by the contractor at Site. Bidder to also list down all high-risk activities and provide the Hazard Identification and Risk Assessment (HIRA) for all such high-risk activities involved in the site work.

(Use Method Statement template attached as annexure A and sample as attachment B)

5. Management System Certification: -

Sr.	Certification	Yes / No	If Yes, Year of Certification	If No, Target date for Certification
	ISO 9001			
	ISO 14001			
	OSHAS 18001 / ISO 45001			
	Any other (please specify……			
Note: Please attach certificates to support above. In case not accredited for above but applied for, application letters may be attached.				

Appendix 8: CSM-F-8 PPE requirements

The Contractor shall ensure that the following PPE of Approved standards shall be available at all time and shall be used by his employees with no exception whatsoever.

1	All contractor's employees at site	Safety Florescent Jacket (orange color), Safety helmet & safety shoes with Composite or steel toe cap
2	Workers mixing asphalt, cement, lime / concrete	Safety goggle & protective Hand gloves and footwear, Nose mask.
3	Welders / Grinders	Welding screen/goggles, safety shoes, leather hand gloves, aprons, leg guard
4	Stone breaker	Protective goggle, hearing protection, anti-vibration hand gloves and Protective clothing.
5	Electricians	Rubber hand gloves & Electrical resistant shoes.
6	Workers engaged in insulation using glass wool etc.	Respiratory mask & leather Hand gloves, goggles.
	Workers engaged in coal handling plant, ash handling plant and working in high dust area.	Dust mask, Hand gloves, protective goggles.
7	Workers working at a height of 1.8 Meter or above.	Double lanyard full body harness, fall arrestor and safety net made of reinforced nylon fiber ropes firmly supported with steel structures

• **PPE shall be conforming to BIS/DGMS/DIN specifications, in good condition and shall be comfortable to his employees, when used.**

Appendix 9: CSM- F-10 Site Safety Management Plan / Method Statement

Site Safety Plan / Method Statement (Template)

This Method Statement describes the specific safe working methods which will be used to carry out the described work. It gives details of work procedure with control measures to counter health and safety issues related to this work. The listed content of this Method Statement can be changed/modified subjected to job scope / specifications, but task specific method statement once finalized & approved, that should not be modified during work execution without permission from the approving authority.

Project/Job Name			
Scope of work: -			
Drawing References: -			
Detail of Sub contractors involved: -			
Method Statement Prepared By: - Designation: - (e.g. Site Manager)		Signature	Date

1.0 Introduction (*Describe purpose of the work, give details of type and scope of work being carried out);*

2.0 Location of Work (*Give site address and precise location on site where work is to be carried out.)*

3.0 Safety Document /Specific Approval Required (Details of any safety documents or specific approval i.e. Client specific approval required to undertake the work)

5.0 Role & Responsibilities of Personnel/Parties Involved in activities: -Clearly define role and responsibilities of all personnel involved in activity i.e. Site management staff including subcontractors' parties- Main contractor Project/Site Manager, Sub Contractor Site Manager, Project Engineer, Safety officer, Competent Supervisory Staff)

6.0 Working/Activity Description: - It *is important that all operatives should have clear idea of those operational sequences and responsible supervisor must verify their competency prior to their engagement in operation.*

6.1 Pre-Working Checks

6.2 Resources (Equipment, tools including manpower) Details *i.e. Equipment and Tools, specific operational equipment, test kits, lifting resources, Details of materials to be used in operation, including any reference to COSHH assessments in case of use of any chemicals, Details of the manpower allocated to the task, e.g. titles, qualifications, competences, direct manpower, contractors. Details of plant, tools and equipment to be used for the work, including the availability of relevant statutory documents, checks or inspections etc. Details of fencing, barriers, cones, chains, dangers notices, warning signs etc.*

Tools required for work:

Sr.No	Tools /Equipment /Machine	UOM	Required Qty.	Remark
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

6.4 Operational Sequence of work: - *Full description of the work, setting out the methodology in a sequential manner, including any reference to any identified operational restraints. Also refer here sec. 5.0 responsibilities part for every step of work sequence).*

Sr.No	Activity	Details of job sequence	Risk Involved	Control Checks
1.		1.		
2.				
3				
4				
5.				

6.7 Final Checks & restoration of work area after completion of work :- *Those checks to be carried out by responsible supervisor in witness of his line hierarchy by use of specific checklist of certain operational checks and once those completed satisfactory, PTW (if applicable) to be closed and isolation arrangements to be restored by removing barricades/cautionary tags.*

7.0 Task Specific Hazards: - *Refer to Task Specific Risk Assessment and attach in appendix*
Attachment: - Specific Risk Assessment
In addition, please provide below control measures in risk assessment *(as applicable).*

Fall Protection Measures: (Where Work at height cannot be avoided)							
Control Measures for Electrical Hazards							
Others Hazard if any (please provide details)							
Hazardous Substances to be used in job : (Attach MSDS if required)	 Acute Toxic	 Health Hazard	 Corrosive	 Dangerous For the environment	 Oxidising	 Highly flammable	 Explosives
	Yes /No	Yes /No	Yes /No	Yes /No	Yes /No	Yes /No	Yes /No

7.0 Emergency Provisions: -*Relevant operational possibility of a programme in the case of emergency situation i.e. electrical supply restoration. In addition emergency response provisions i.e. first aiders, fire fighting, and first aid arrangements, nearest onsite/offsite emergency response also to be considered during emergency planning.*

8.0 "5S issues" / Waste Disposal/ Housekeeping and Environmental issues: -*Details waste disposal processes and or housekeeping activities, Details of environmental impacts and control measures.*

9.0 Personal Protective Equipment (PPE):- (*Tick on PPE requirements for the task/Job*

Required Personnel Protective Equipment:	 Safety Boots	 Hard Hats	 Safety Gloves	 Hearing Protection	 Eye Protection	 Respiratory Protection	Other: 1. Hi-Viz 2. Coveralls 3.

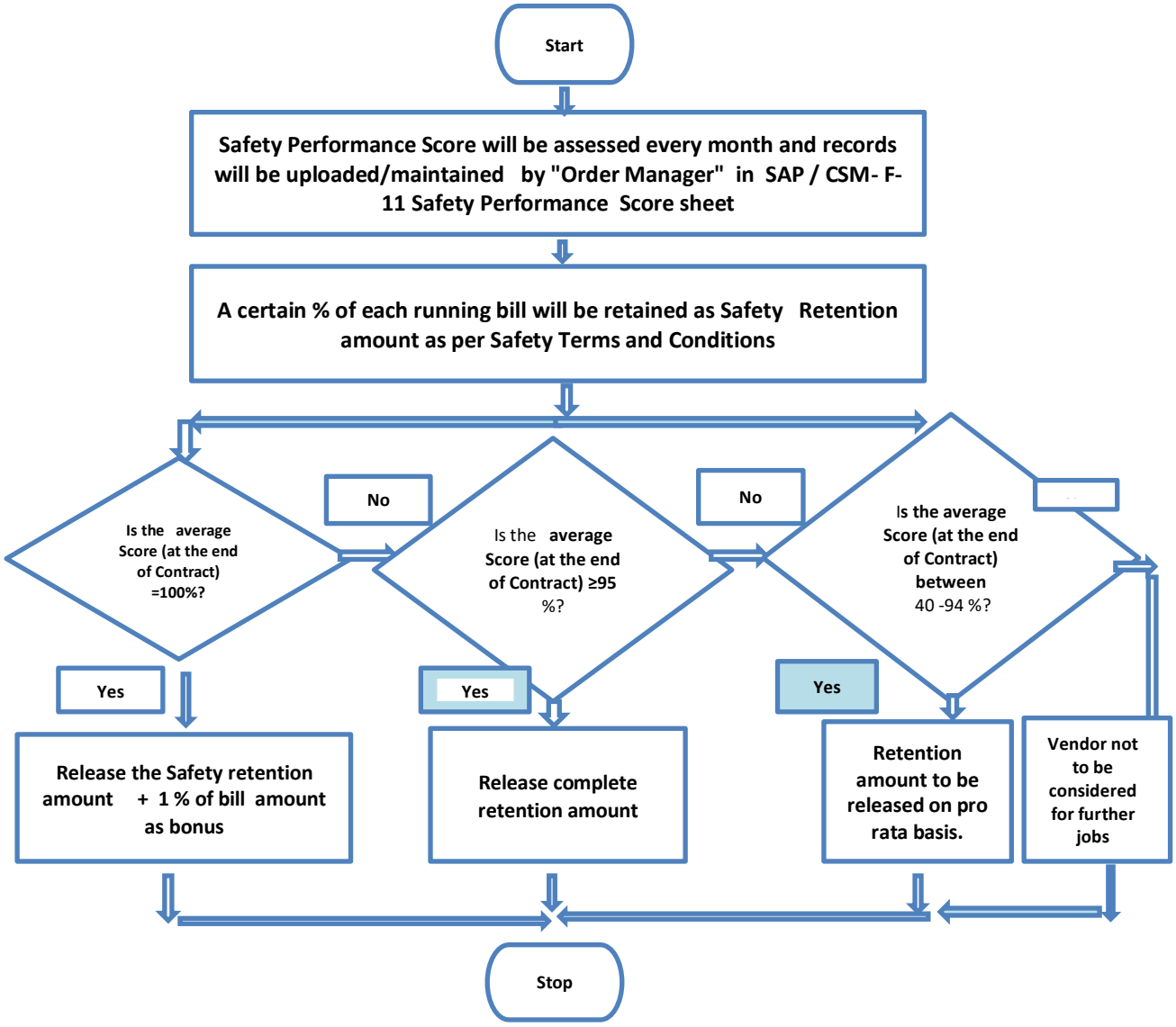
10.0 First Aid facilities and Nearby Hospitals Details

 First Aid Facilities:	Name of On-Site First Aider:	
	First Aid Box Location:	
	Location of Nearest Hospital:	

11.0 Occupational Health, Fitness and COVID-19 related Preparedness:

1. Please give a brief writeup / methodology of your organization planned to avoid impact of the COVID-19 pandemic at Tata Power working site. 2. Please give brief details of occupational health and hygiene related interventions planned by your organisation to ensure good health and fitness of workforce at Tata Power site.

Appendix 10: Process Flow Chart for Safety Performance Evaluation



Appendix 11: CSM- F-11 Safety Performance Score

Sr. No	Parameter	Unit of Measurement	Target	Weightage	Actual Performance	Actual Score
Lead Indicator						
1	% of Employee certified in TPSDI/Authorized agency	Number	50%	10		
2	CFSA score (Annexure 6.1)	Average Severity of Violations	1.49	20		
3	Monthly inspection completed for Critical Equipment, lifting Tools & Tackles and hand tools used at site	Number	80%	10		
4	Condition of critical tools, tackles and equipment	Number	100%	10		
Lag Indicator						
1	Number of Fatalities	No	0	30		
2	Number of Lost workday case (LWDC) (reportable)	No	0	10		
3	Man-days Lost	Man-days	0	10		
					Final Score	
					Invoice Value	
					Amount to be released	

Safety Performance Evaluation Criteria

Lead Indicators

	Target			
% of Employee certified in TPSDI/Authorized agency	50%	100%	Less than 100%	
Score		10	5	
	Target			
CFSA score	<=1.49	1.5 to 2.5	2.51 to 3.5	>=3.51
Score	20	15	10	0
	Target			
Monthly inspection completed for Critical Equipment, lifting Tools & Tackles and hand tools used at site	>=80%	79 to 50%	<50%	
Score	10	7	0	
	Target			
Condition of critical tools, tackles and equipment	100%	<100%		
Score	10	0		

Lag Indicators

Number of Fatalities	0	>0	
Score	30	0	
Number of LWDC (reportable)	0	>0	
Score	10	0	
Number of man days lost	0	1 to 5	>5
Score	10	5	0

Appendix 12: CSM-F-5 Safety Potential Evaluation Criteria for Vendor Registration

At the time of vendor registration, vendor will be registered under 3 categories

1) **Category A**- Vendors eligible to carry out High risk Jobs
2) **Category B**- Vendors eligible to carry out technical jobs that are low risk
3) **Category C**- Vendors eligible to carry out administrative and office jobs
4) **Category D**- Outsourced Jobs / Consultants /Medical Practitioners / Suppliers etc

For vendors to be registered under **Category A**, a safety potential evaluation will be carried out based on following parameters.

Sr. No	Description	Weightage (%)	Actual Score	Remarks
1	Does the contractor have a valid ISO 45001/ OHSAS 18001/ Certification?	30		
2	During site visit check for safety adequacy at site	30		Annexure - 12.1
3	Check the Safety statistics of Contractor	10		Annexure - 12.2
4	Check the Safety orientation & training process of Contractor	15		Annexure 12.3
5	Check the organizational structure for safety professionals & engineers / supervisors.	10		Annexure - 12.4
6	Certified/skilled workers as a percentage of overall workforce	5		
	Total	100		

Evaluation Criteria for Category B

Sr. No	Description	Weightage (%)	Actual Score	Remarks
1	Does the contractor have a valid ISO 9001 certification?	30		
2	During site visit check for safety adequacy at site	30		Annexure -12.1
3	Check the Safety statistics of Contractor	10		Annexure -12.2

4	Check the Safety orientation & training process of Contractor	15		Annexure -12.3
5	Check the organizational structure for safety professionals & engineers / supervisors.	10		Annexure -12.4
6	Certified/skilled workers as a percentage of overall workforce	5		
	Total	100		

Evaluation Criteria for Category C

Sr. No	Description	Weightage (%)	Actual Score	Remarks
1	Does the contractor have a valid ISO 9001 certification?	40		
2	Check the Safety statistics of Contractor	40		Annexure - 12.2
3	Check the Safety orientation & training process of Contractor	20		Annexure - 12.3
	Total	100		

Annexure 12.1: Evaluation Criteria for Category D:

Category D does not require any evaluation as it is for outsourced job outside the Tata Power company premise.

Annexure 12.2

Check List – Adequacy of Safety Statistics of Service Provider			Actual Marks obtained	Remarks
1	Check the safety statistics for last 3 years (LTIFR and LTISR)	Statistics available: Marks 5; Statistics not available: 0		
2	Check the trend LTIFR for last 3 years	LTIFR value: 0 to 0.2 – Marks 5; 0.21 to 0.3 – 2.5; >0.3 – 0		
3	Check the trend of LTISR last 3 years	LTISR value: 0 to 2 – Marks 5; 2 to 3 – 2.5; >3 – 0		
4	Has there been any Prosecution/Conviction for any contravention with regard to Safety & Health provisions under the Factories Act /Electricity Act/ BOCW Act and Rules framed there under?	Marks: No Prosecution 10; Prosecution 0. To be provided in written on letter head		
	Total	**25**		

Annexure 12.3

Check List – Adequacy of Safety orientation & training process of Service provider			Actual Marks obtained
1	Records of safety trainings provided to safety officer/supervisor/workmen during last 1 year as percentage(%) of total employed by service provider	**Safety Officer** / Marks ≥80% of employees / 5 50 to 79 % of employee / 2.5 < 50% / 0 **Safety Supervisor** / Marks ≥80% of employees / 10 50 to 79 % of employee / 6 < 50% / 0 **Workmen** / Marks ≥80% of employees / 10 50 to 79 % of employee / 6 < 50% / 0	
	Total	25	

Annexure 12.4

Check List – Adequacy of organizational structure for safety professionals & engineers / supervisors.			Actual Marks obtained
1	Check availability of number of safety officers from government recognized institute as per workforce strength.	Marks 1 in 50 employees / 10 1 in 100 employee / 6 Any other / 0	
3	Check availability of qualified workforce from government recognized institute/TPSDI.	Marks 100% of safety officers qualified / 5 50 – 99% of safety officers qualified / 3 <50 / 0	
	Total	15	

Appendix 13: CSM-F-9 Safety Bid Evaluation Criteria.

The User has to select whether the job is high risk/ long duration at time of raising the PR.

1) The decision whether job is "**high risk** "or not has to be made by order manager on the basis of Risk involved (Risk Priority Number in HIRA) of the Jobs. An indicative list of high-risk jobs is attached as annexure
2) If a technical job is of low risk with estimated duration of the contract is 1 year or more the job should be treated as "**long duration**".
3) All Safety bids will be evaluated by Safety Concurrence Group. Structure of SCG will be declared by Corporate safety. Corporate safety team will audit bid evaluation process of a few selected jobs and Quality of evaluated safety Bids.
4) Records of jobs sent by for Safety Bid evaluation shall be maintained by Corporate Contract team in existing tracing sheet along with other jobs.
5) For Safety Bid Evaluation will be based on following parameters.

		Minimum Requirement	**Weightage (%)**	**Score Obtained**
Manpower	**Safety Officer (1 per 500 workers)**	**Qualification-** Officer shall possess Advance Diploma In Industrial Safety by state technical board. **Experience**- Minimum 1-year experience in relevant field as mentioned in the job in PR.	5	
	Safety Supervisor (1 per work site up to max. 50 workers)	**Qualification-** Supervisor shall possess ITI/ Diploma in relevant field. **Experience**- Minimum 2-year experience in relevant field as mentioned in the job in PR. **Training** – Trained and certified by TPSDI or equivalent institute in relevant safety procedures. **Note:** On request of the contractor/Users -TPDSI should vet & certify the skilled & experienced	5	

		Technician if Technical Qualification is not adequate.		
	Technician (Skilled workers as electrician, rigger, fitter, welder, cable jointer, line men etc)	**Experience**- Minimum 2 year experience in relevant field as mentioned in the job in PR. **Training** – Trained and certified by TPSDI or equivalent institute in relevant safety procedures.	5	
Tools & Tackles	Equipment / Machines/ Tools & Tackles(lifting and shifting tools)	The list of Equipment /Machines / Tools and tackles to be used for job to be submitted by the contractor. Evaluation of the list will be carried out based on 1) Suitability as per the relevant job 2) Make and age of the tools from authorized agencies defined by the user. 3) Certification by the competent authority of respective state.	30	
Safety Records	Safety Records	Safety Records for last 3 years (as per vendor or as per our knowledge) – Recommendation?	15	
Safety Plan	HIRA/Contract Job Safety Plan	Adequacy of HIRA and Job Safety Plan with respect to relevant job. More weight age will be given to vendor for using mechanized work and advanced tools and equipment	20	
Accredited Bodies certificate	ISO-9001	ISO-9001	2	
	ISO-14001	ISO-14001	3	
	OHSAS 18001 ISO 45000	OHSAS 18001/ISO 45000	15	
		Total Score		

6) Vendor entitled to carry out the job only when qualified for the safety evaluation as follows:

Contractor is qualified in safety bid only if his total score is more than 70% in all category 1 jobs such as high risk/long duration.

7) The Corporate Contract has to ensure that the vendor provides the filled "Safety Competency Form" along with the quotation.
8) Corporate Contract will forward the Safety Competency Form received from the contractor to the Safety Concurrence Group for evaluation.
9) In case SCG wants to visit the site, the Safety Competency will be based on evaluation at the time of site visit Annexure 13.1

Annexure -13.1:

Checklist to be used: During site visit to check the adequacy Safety systems.			
		Observation	Score* (1-5)
1	Check the adequacy of safety policy and Safety Management system of the contractor.		
2	Does the contractor have written down safety procedures?		
3	Check the records of Near miss, unsafe act, unsafe conditions and incidents.		
4	Check the organization setup to implement the safety systems at site (safety officer, safety supervisor)		
5	Check whether safety meeting and toolbox talk carried out regularly and records maintained or not.		
6	Is the process of incident investigation adequate or not?		
7	Verify incident reporting and recording system		
8	Check the usage of equipment/tools and tackles.		
9	Check for housekeeping at site		
10	Check the use of PPEs and general behavior of workforce towards safety		
	Total Score		
	Site Visit Score		

Score*- rating on the scale of 1-5 to be given based on the observations on site. Score of 1 is the lowest and core of 5 is the highest.

Appendix 14: CSM-F-11.1 CFSA Format

CONTRACTOR FIELD SAFETY AUDIT

Project Name :

Date:

Description of Severity rating:		**Audit Team:**	
	1 = Untidy area, minor issues, sets poor example		
	2 = Restricted access, unacceptable trash, disorderly		
	3 = Rule or procedure violation, potential injury		
	4 = Unsafe condition, serious injury potential		
	5 = Immediate serious injury potential, stop activity immediately and correct	**Audit Time:**	10:00hrs -11:30 hrs
		Weather:	cloudy

		Responsible		**Number Personnel Observed**		**Violations**			**Remarks**	Leading Indicators			
	Description	**Engineer**	**Contractors**	**Good Citizens**	**Violators**	**Number of Violations**	**Severity**	**Violations x Severity**		4 & 5	PPE	Unsafe Act	Unsafe Condition
Area													
1													
	Sub Totals			**0**	**0**	**0**	**0**	**0**		**0**	**0**	**0**	**0**
	% of Observed People Working Safely												
	Number of Violations												
	Average Severity of Violations												
	Number of Severity 4 & 5 Violations												
	% of 4 & 5 Violations												
	Approximate Number of Workers Observed												
	Number of People on Site												
	% of Workers Observed												

Appendix 15: Indicative List of High-Risk Jobs

To access the exhaustive list of High-risk jobs, please refer the following documents

1) High Risk Jobs- Generation
2) High Risk Jobs- T&D
3) High Risk Jobs- Renewable

Indicative List of High-Risk Jobs -Generation Cluster					
Sl. No.	**Jobs**				
1	Demolition / Painting of Chimney				
2	Survey Sounding Jobs in Sea				
3	Dredging at Coal Birth Jetty				
4	Maintenance / Testing and Replacement of Extra High Voltage (132 KV etc.) Switchyard equipment				
5	Maintenance of EOT Cranes				
6	Deep excavation (5 feet or more) near existing buildings /Structure s				
7	Working inside confined spaces (entry through manhole)				
8	Operation Maintenance of elevators				
9	Working on Live control Circuits for identification of faults				
10	Cable laying and termination Jobs				

Indicative List of High-Risk Jobs - T&D Cluster					
Sl. No.	**Jobs**				
1	Transmission Line Tower Erection on columns, near live lines, In congested areas, In creeks, In the Sea				
2	Conductor Stringing on Tower Using Tensioner & Puller in the area such as Line Crossing, Near Live lines, Congested Areas, Road Crossing, Bridge Crossing, Railway line Crossing, In creeks ,In the Sea				
3	Cable Pulling by Using winch Machine in City and Rural Areas				
4	Hot Washing of HT and Extra HT lines, Towers and switchyards equipment				
5	Installation of Lifts				
6	Installation of EOT Cranes				
7	Tower Dismantling				
8	Working on H Frame /Pole mounted Transformers				
9	Excavation in operational Area heaving power cables in receiving station				
10	Identification and spiking of cable / disconnection of cables from poles				

Indicative List of High-Risk Jobs - Renewable Cluster					
Sl. No.	**Jobs**				
1	Working on Electrical Panels				
2	Hi Potting of Equipment				
3	Battery commissioning and maintenance				
4	Working on the nasal of Wind Turbine				
5	Working on live electrical switchyard, material Handling and Equipment installation				
6	Roof Top Solar Panels Installation and maintenance				
7	Working in live Electrical Switchyard, Material Handling, equipment installation				
8	All maintenance activities that requires climbing on Towers /Structures / Transformer/ GODs				
9	Loading and Unloading of Solar Panels on trucks				
10	Structural Repair /Dismantling work at height.				

Annexure IX

Tata Code of Conduct (TCoC)

TATA CODE OF CONDUCT

The Owner abides by the Tata Code of Conduct in all its dealing with stake holders and the same shall be binding on the Owner and the Contractor for dealings under this Order/ Contract. A copy of the Tata Code of Conduct is available a tour website:

https://www.tatapower.com/pdf/aboutus/Tata-Code-of-Conduct.pdf

The Contractor is requested to bring any concerns regarding this to the notice of our Chief Procurement & Stores e-mailID: pkjain@tatapower.com.

Annexure X

Environment & Sustainability Policy

ENVIRONMENT & SUSTAINABILITY POLICY

CORPORATE ENVIRONMENT POLICY

Tata Power is committed to a clean, safe and healthy environment, and we shall operate our facilities in an environmentally sensitive and responsible manner. Our commitment to environmental protection and stewardship will be achieved by:

- Complying with the requirements and spirit of applicable environmental laws and striving to exceed required levels of compliance wherever feasible
- Ensuring that our employees are trained to acquire the necessary skills to meet environmental standards
- Conserving natural resources by improving efficiency and reducing wastage
- Making business decisions that aim towards sustainable development
- Engaging with stakeholders to create awareness on sustainability

(Praveer Sinha)
CEO & Managing Director

Date: 15th June, 2018

TATA POWER
Lighting up Lives!

CORPORATE SUSTAINABILITY POLICY

At Tata Power, our Sustainability Policy integrates economic progress, social responsibility and environmental concerns with the objective of improving quality of life. We believe in integrating our business values and operations to meet the expectations of our customers, employees, partners, investors, communities and public at large

- We will uphold the values of honesty, partnership and fairness in our relationship with stakeholders
- We shall provide and maintain a clean, healthy and safe working environment for employees, customers, partners and the community
- We will strive to consistently enhance our value proposition to the customers and adhere to our promised standards of service delivery
- We will respect the universal declaration of human rights, International Labour Organization's fundamental conventions on core labour standards and operate as an equal opportunities employer
- We shall encourage and support our partners to adopt responsible business policies, Business Ethics and our Code of Conduct Standards
- We will continue to serve our communities:
  - By implementing sustainable Community Development Programmes including through public/private partnerships in and around our area of operations
  - By constantly protecting ecology, maintaining and renewing bio-diversity and wherever necessary conserving and protecting wild life, particularly endangered species
  - By encouraging our employees to serve communities by volunteering and by sharing their skills and expertise
  - By striving to deploy sustainable technologies and processes in all our operations and use scarce natural resources efficiently in our facilities
  - We will also help communities that are affected by natural calamities or untoward incidence, or that are physically challenged in line with the Tata Group's efforts

The management will commit all the necessary resources required to meet the goals of Corporate Sustainability.

(Praveer Sinha)
CEO & Managing Director

Date: 15th June, 2018

TATA POWER
Lighting up Lives!

SUPPLIER MANUAL ANSWERING

TO

E-BIDDING & E-AUCTION

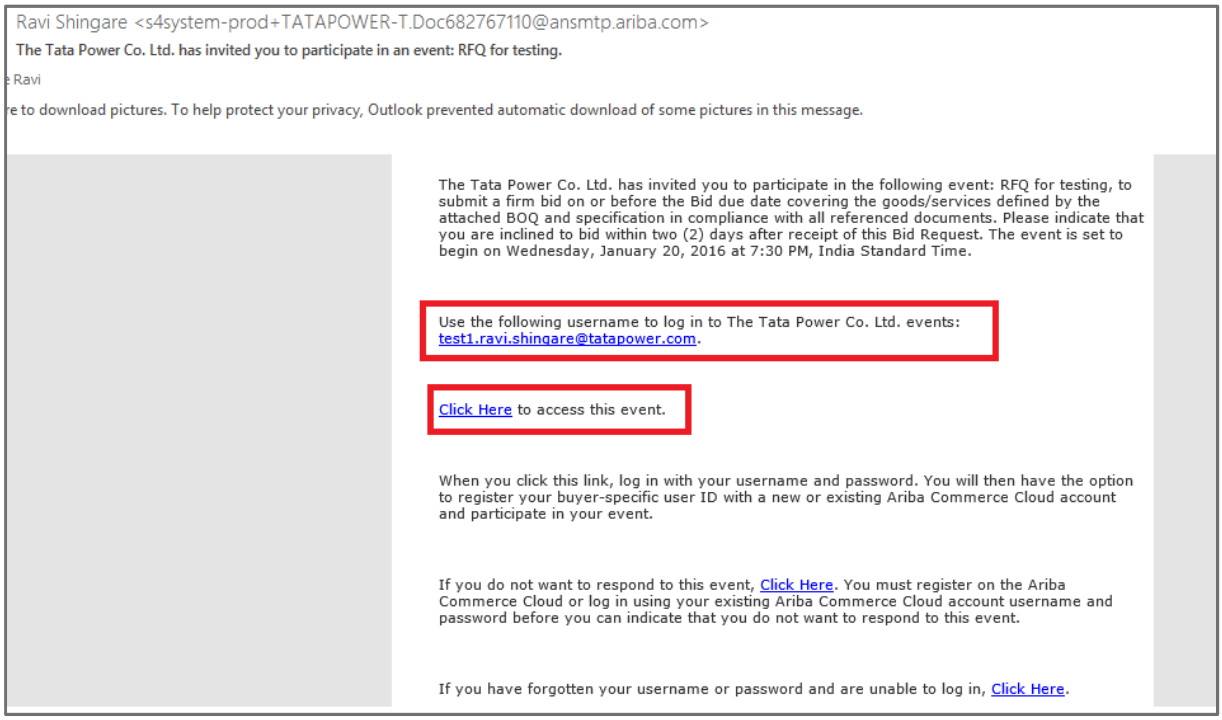
	Version 1.1
Company Confidential	DEC - 2016

INDEX

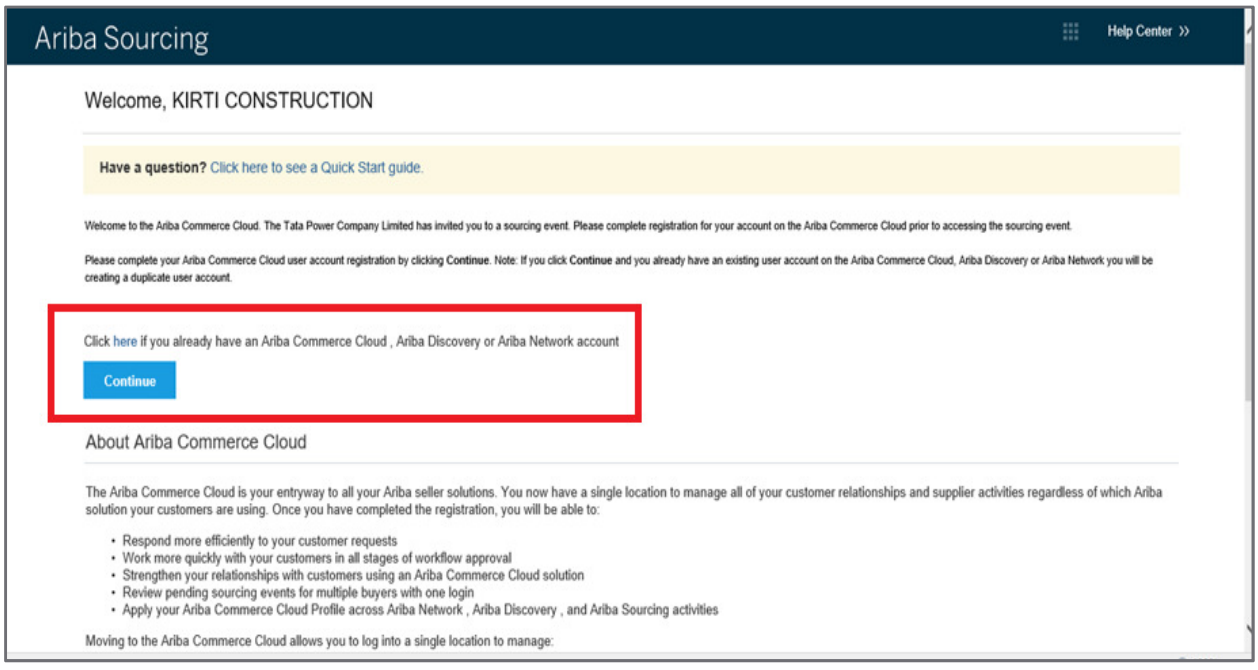
1- Accessing Ariba Sourcing

Step 1: You will get an invitation to your email from Ariba System. Keep this email, it contains your login Information and a direct link to Ariba.

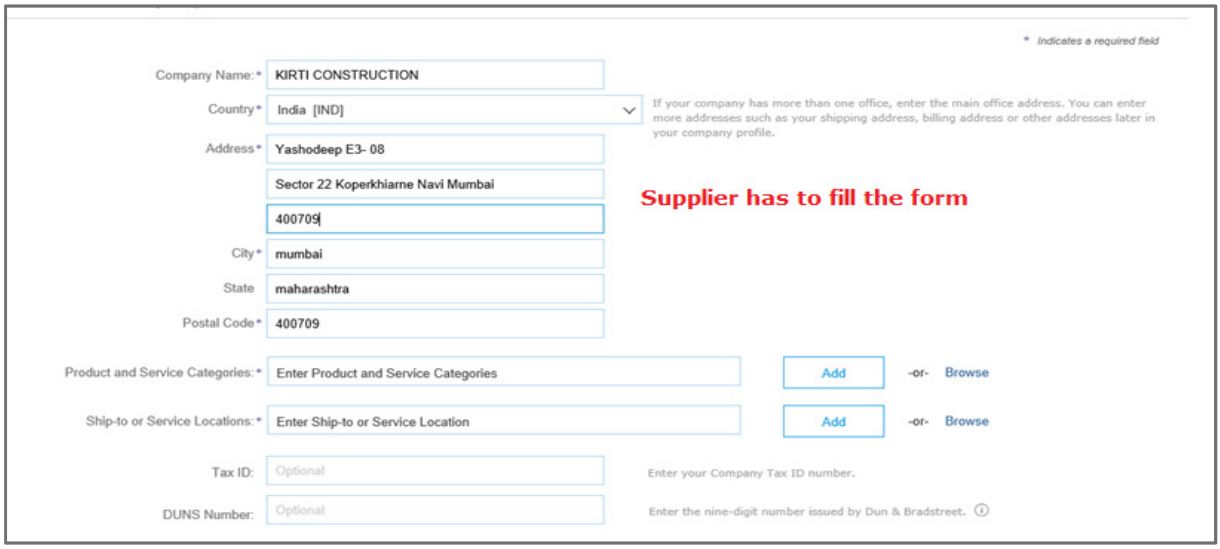
Step 2: Click “Click Here” to access the Ariba Web Site.



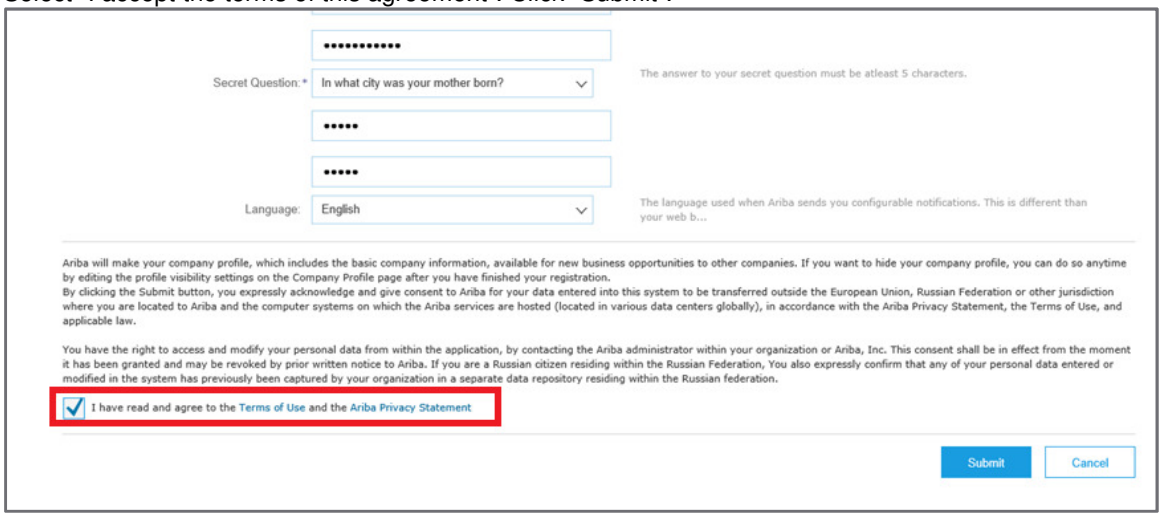
Step 3: Supplier has to click on "Continue"



Step 4: The registration process only takes a few moments, with a simple one-page registration Define your password and secret question. Click “OK”



Step 5: If it’s the first time you are invited to use UPM Ariba, you’ll need to accept the “Participant Terms”. Select “I accept the terms of this agreement”. Click “Submit”.

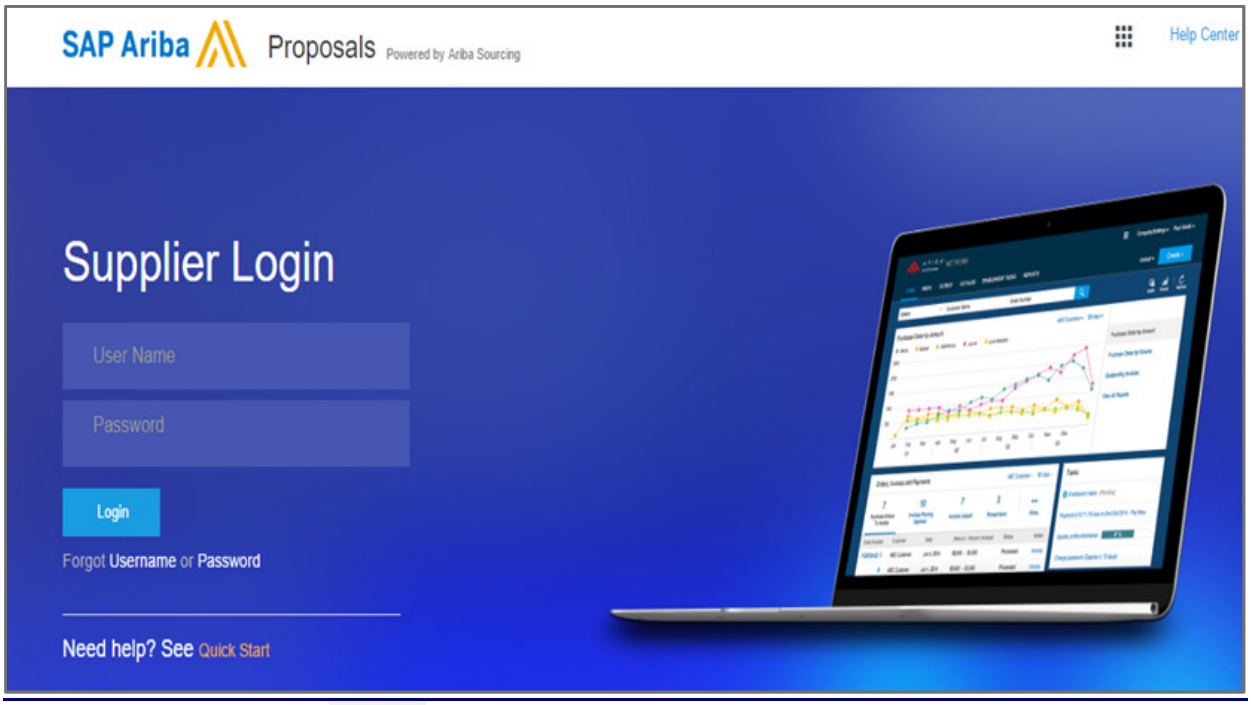


2 Vendor Screen

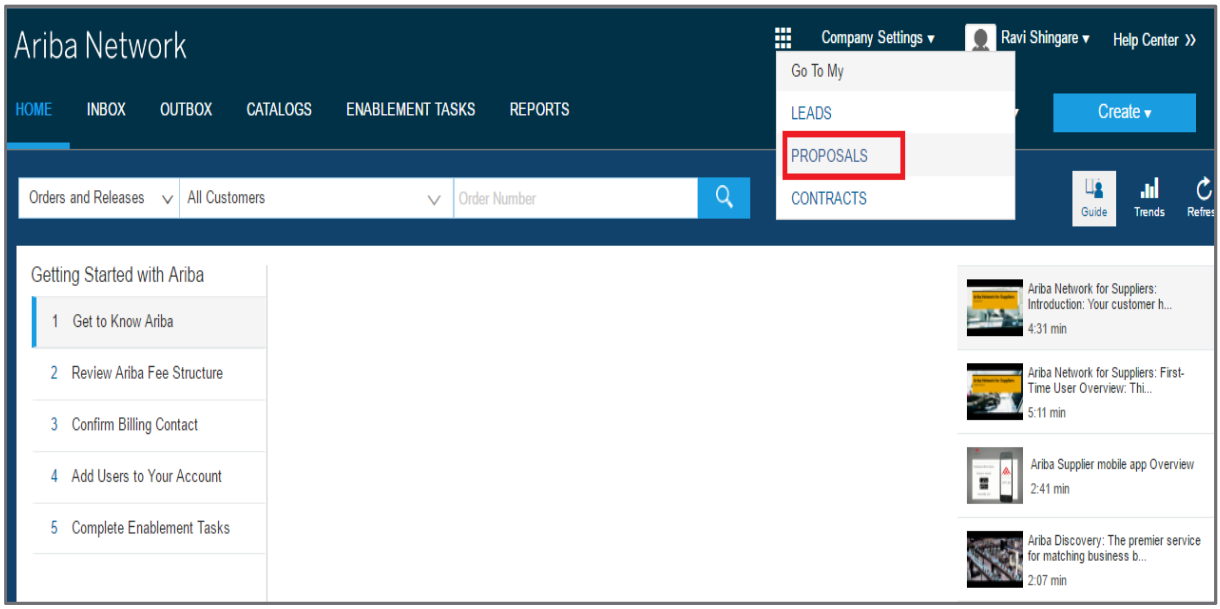
2.1.1 If vendor goes through mail invitation then directly Screen 3.1.1 will appear, but if If you have used Ariba before and have already accessed an event for the buyer-specific account with your current log in ID, click the **Login** button to continue. Log in with your Ariba username and password in order to participate in the event OR you have to follow the following steps.

Step 1 - Log on **supplier.ariba.com**

Step 2 - Put your USER ID and Password in following screen



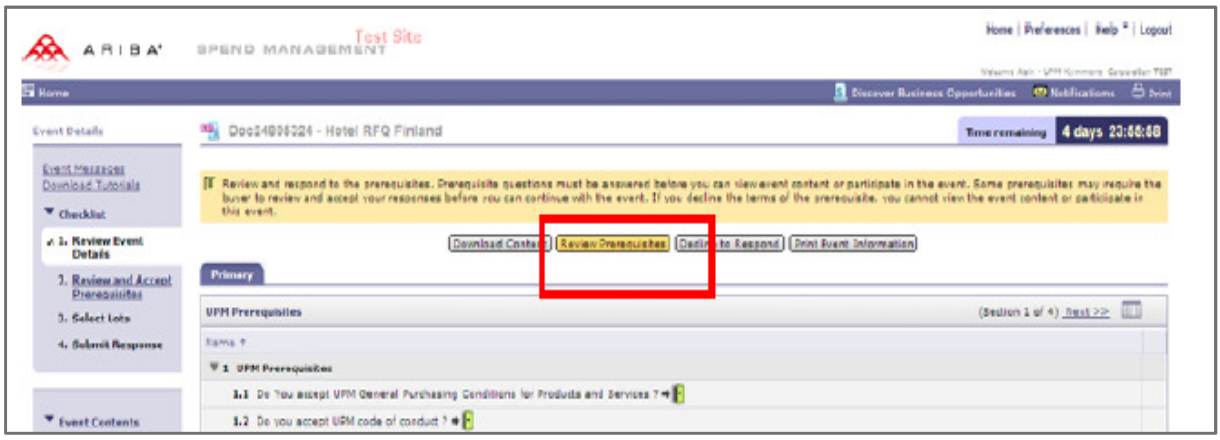
Step 3 - Go to ARIBA APPS  and click on Proposals.



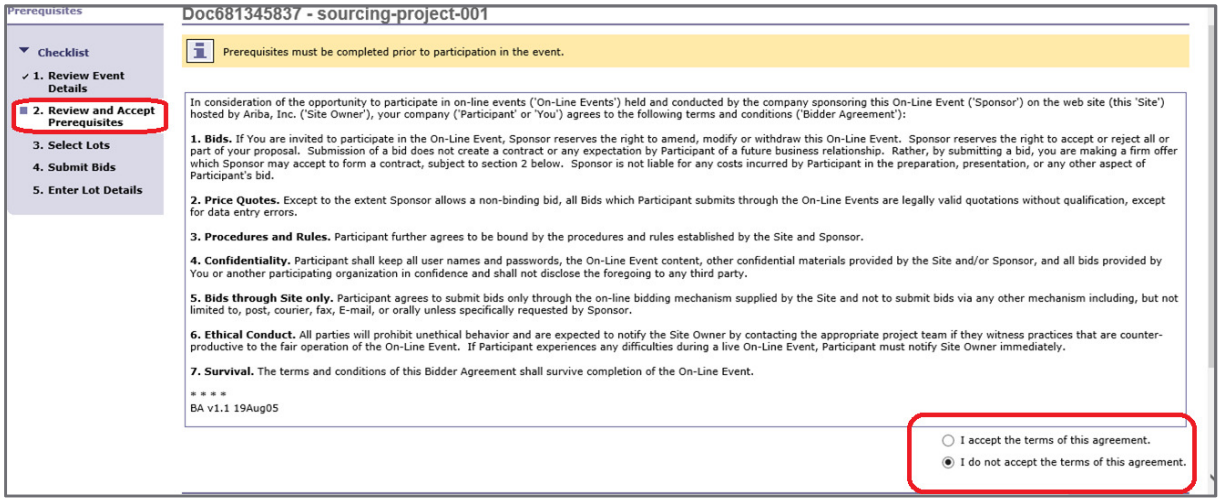
3 Submitting Your Answers / Proposal

3.1.1 Review and Approve “Prerequisites”

Step 1: Review and download all documents & then Click on “Review Prerequisites”



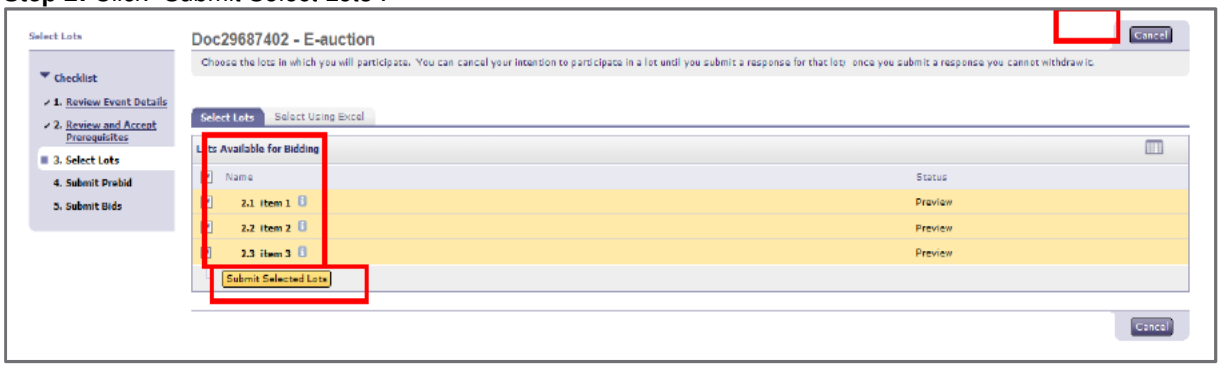
Step 2: Review and accept “Bidder Agreement”.



3.1.2 Select Items or Lots

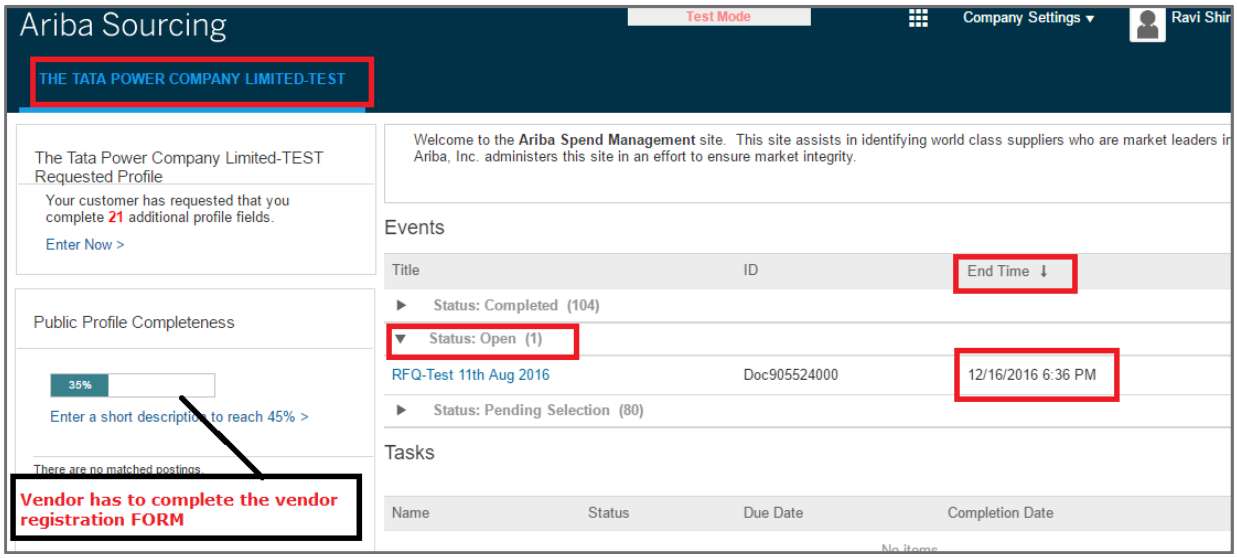
Step 1: Select Items. - If you do not want to quote for any items/lots then you do not select that lot / items and then go ahead for select and submit lot.

Step 2: Click “Submit Select Lots”.



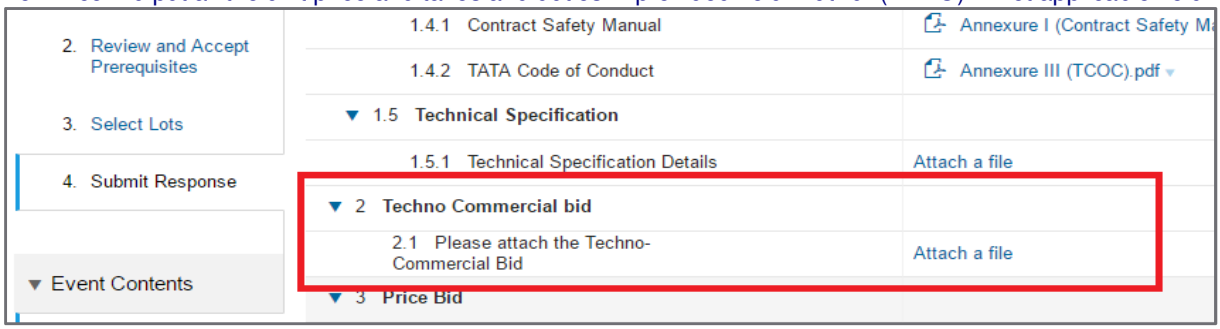
3.1.3 Entering your offer for RFQ

Step 1: as per following screen Vendor Dashboard will appear where RFQ from TATA Power will be visible.

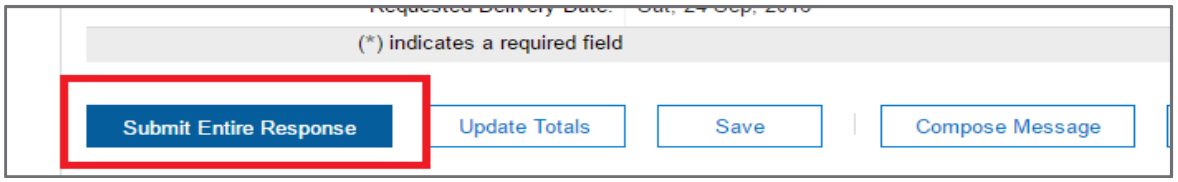


Step 2 - Follow all the steps of 3.1.1 to 3.1.3

Step 3 - Vendor has to submit their techno commercial offer in 2.1. In this field Do No attach any price content. For Price Bid put all the unit price and taxes and duties in provided field. Put "0" (ZERO) in not applicable field.



Step 4 - After successfully putting Techno commercial offer and price part then click on "Submit Entire Response"

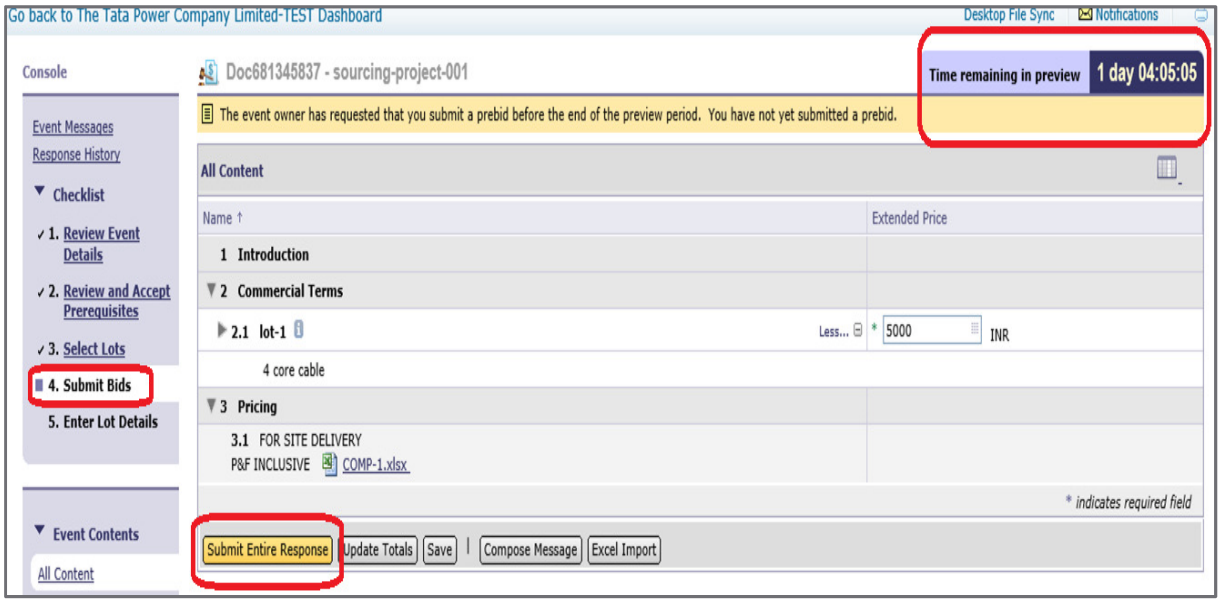


3.1.4 Entering Your Prebid for e-auction

Before participation to the e-auction you must place a pre-bid. If you haven't placed a Prebid in the Prebid time you won't be able to participate to the auction itself.

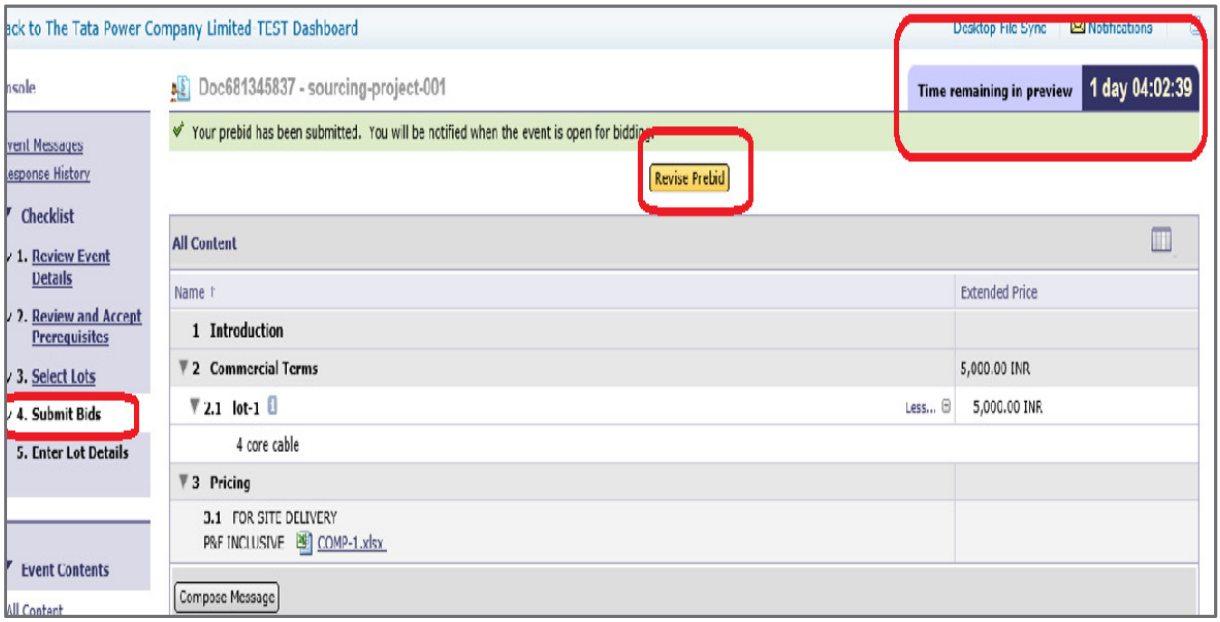
Step 1: Populate Your Answers.

Step 2: Click "Submit Entire Response".



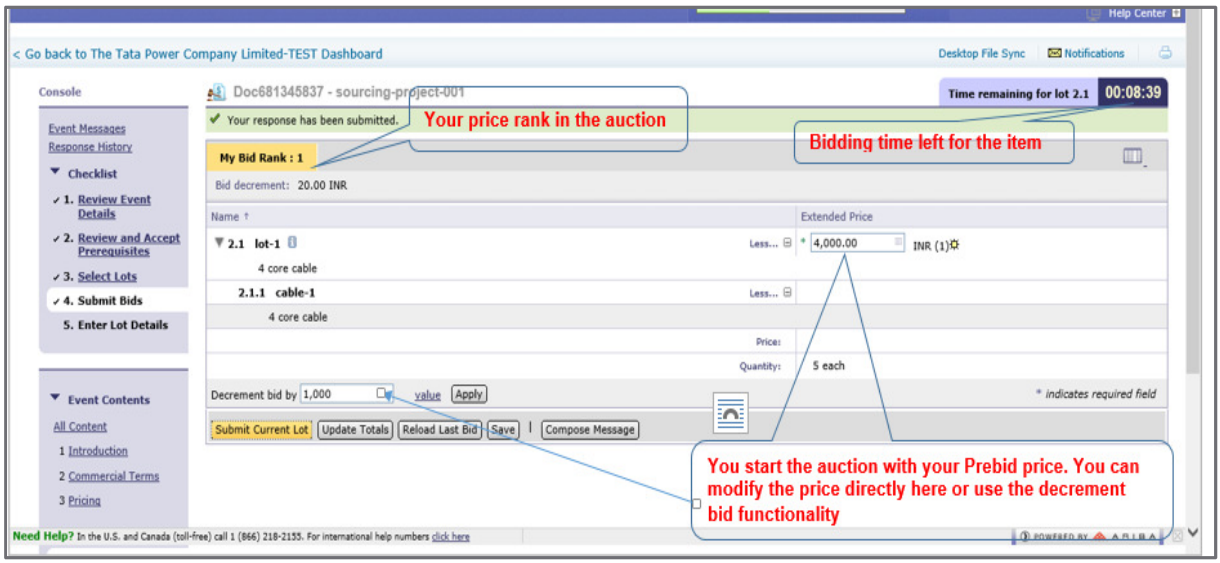
When the Prebid time is still open you can still modify your Prebid:

Click on "revise Prebid" and repeat in step 1 and step 2.



3.1.5 Participate to the e-auction

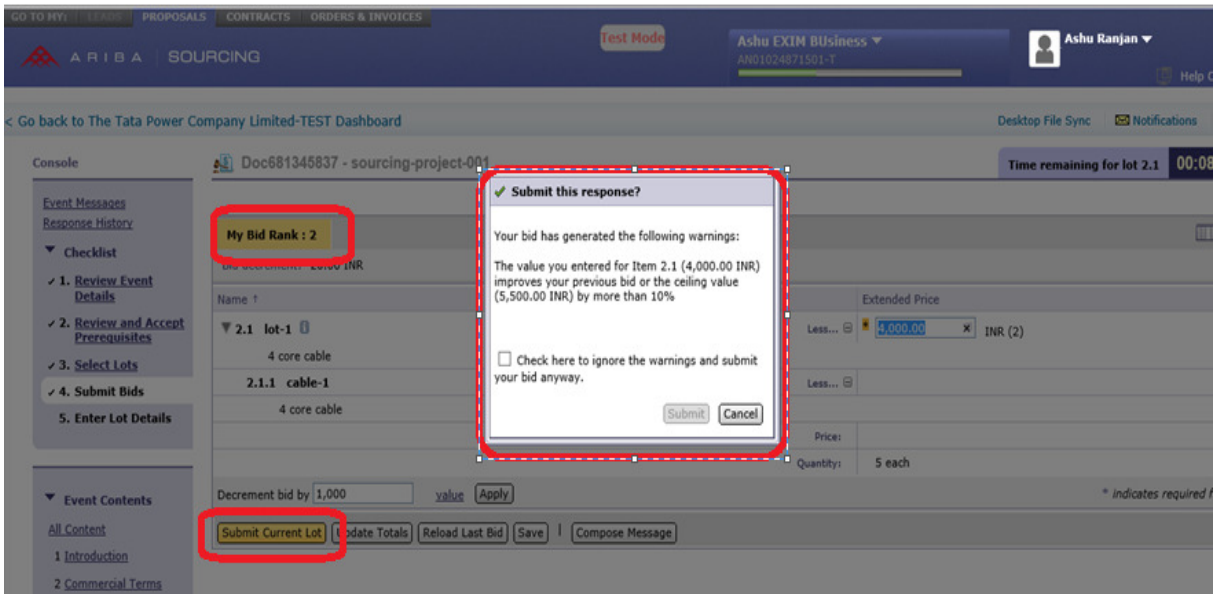
If you have placed a bid in the Prebid time you will be able to participate to the e-action. E-auctions are rather sort in time (usually less than 20 min per item). Once the time is closed you won't be able to bid anymore.



When you want to submit your price presses "submit current lot"

In case the new price you submit is lower by 10% of the starting price (Prebid Price) the following warning Message will be displayed.

To submit the new price, check the box and press submit. If you made a mistake press cancel so that you Mistake would not be submitted.



3.1.5.2 What to do if you have a problem during the e-auction?

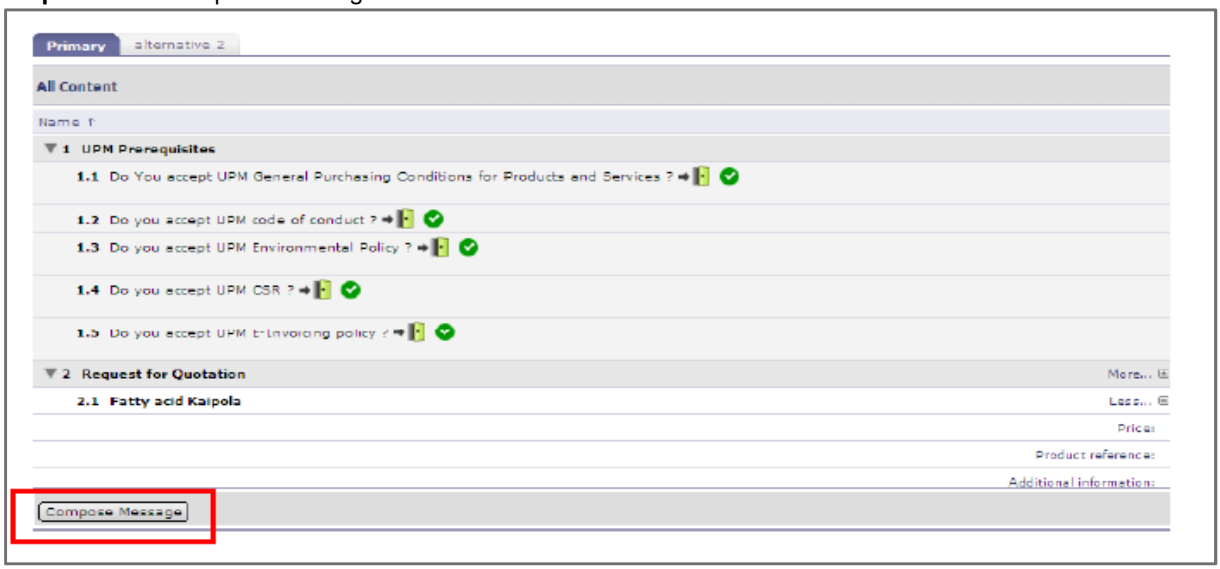
If you have any problem related the system: - **Call first Tata Power e- Bidding / Auction Cell**

- **e- Bidding /Auction Cell details:-**

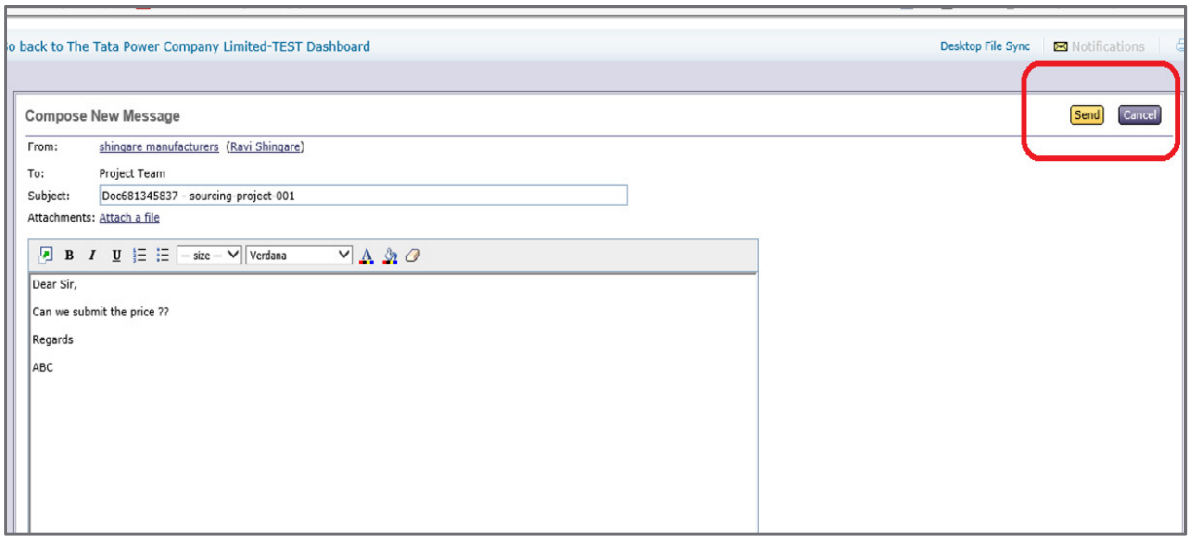
Core team		
Contact Person	**E-Mail Id**	**Contact Details**
Ravi Shingare	ravi.shingare@tatapower.com	9029004168
Himanshu Ranjan	himanshur@tatapower.com	9820339961
Escalation Matrix		
Paresh Bhatt	pareshbhatt@tatapower.com	
C T Prakash	ctprakash@tatapower.com	9223545185

4 Communicating with Tata Power Buyer & Auction team during auction / e- bidding

Step 1: Click "Compose Message".



Step 2: Compose Your Message and click "Send".



SUPPLIER-FREQUENTLY ASKED QUESTIONS

- **If I registered on my buyer's Ariba Sourcing site in the past, do I need to register again?**

Answer- Yes. Although you have registered on your buyer's Ariba Sourcing site in the past, registering on the Ariba Commerce Cloud is required. The registration process only takes a few moments, with a simple one-page registration. Registering on the Ariba Commerce Cloud gives you access to all your buyer relationships with one username and password.

- **What is the Ariba Commerce Cloud?**

Answer: - The Ariba Commerce Cloud is your entry point to all of your seller solutions.
Rather than managing log in information for multiple buyers' sites, you will have one log in and one account. This means fewer passwords to remember, easier user maintenance for your company, and a unified profile for your organization.

- **Do I need to add Product and Service Categories during registration?**

Answer:-Yes; this is a required field. Product and Service Categories classify what your company sells, and the system uses this information to match potential business opportunities with your products and services.

Click **Add Product and Service Categories** to select one or more categories from the list of options. During registration, you only need to choose one category, preferably related to the event you are joining. You can add, refine, or remove categories any time after the registration process.

- **Do I need to add ship-to or service locations during registration?**

Answer: - Yes; this is a required field. Ship-to or Service locations inform buyers where your company sells its products or provides its services, and the system uses this information to match potential business opportunities with your products and services.

Click **Add Ship-to or Service Locations** to select one or more sales territories from a list. You can add, refine, or remove ship-to or service locations any time after the registration process.

- **Do I need to enter a D-U-N-S number when I register?**

Answer: - No; this is an optional field. You are only required to complete the fields marked with an asterisk (*). If you enter a D-U-N-S number, and you get a message that the value is already in use, leave the field blank, as D-U-N-S numbers must be unique within the Ariba Commerce Cloud. Your company can have multiple Ariba accounts, but only one account can use the D-U-N-S number.

Additional Information: - D-U-N-S is a registered trademark of Dun & Bradstreet or its subsidiaries in the United States and other countries.

- **Do I need to enter a Tax ID when I register?**

Answer: - No, the Tax ID is an optional field. You are only required to fill in the fields marked with an asterisk (*).

- **What is the difference between the Email and Username fields in my profile?**

Answer: - The Email field represents the email address where you wish to receive email notifications. The Username field is the identifier that you use to access your account. The Username field must be in email format, but you do not have to use a valid email address.

Note: Leave the **This is my username** box checked if you want your email address to be the same as your username.

- **How do I participate in my buyer's event using an email invitation?**

Answer: - Use the **Click here** link in the email notification to access the sourcing event.

While buyers might customize the email content you receive, all email invitations contain a link to access the event.

Depending on your previous experience with Ariba solutions, do one of the following to access the event after you click the link:

- If you are new user, click **Continue** on the welcome page. You continue to register an Ariba account to link with your buyer and participate in the event.
- If you have used Ariba before and have already accessed an event for the buyer-specific account with your current log in ID, click the **Login** button to continue. Log in with your Ariba username and password in order to participate in the event.
- If you already have an existing Ariba Network, Ariba Discovery, or Ariba Sourcing supplier account, but you have not accessed any events for the inviting buyer's site, use the **Click here if you already have an Ariba Commerce Cloud, Ariba Discovery or Ariba Network account** link. After clicking the link, log in with your existing account to move your information to your buyer's site.

Additional Information :- Registering an Ariba account provides you with a consolidated view of all your customer relationships. With this one profile, you can view business opportunities, participate in sourcing events, participate in contract negotiations, and manage orders, catalogs, and invoices.

- **Why doesn't the link in the email invitation to participate in a sourcing event work?**

Answer:-If you cannot click the link, or the link does not open the log in page, highlight and copy the Uniform Resource Locator (URL), and then paste the URL into your web browser.

- **Can my company have multiple accounts?**

Answer:-Your Company can have multiple Ariba accounts, depending on your business needs. For example, if your company has several locations around the world, you might want a separate account for each region.

Most companies choose to have one account with multiple customer relationships, which provides a centralized location to maintain their company profile information and all of their customer relationships.

Additional Information

Consider the following items when deciding whether to have more than one account:

- **Administrators**: For each account, you can have only one account administrator, but the account administrator can provide access to multiple users. All users from your company have their own **Username** and **Password** to access the account.
- **DUNS** (data universal numbering system) **numbers**: You can add your company's DUNS number to only one account. If you plan to have multiple accounts, leave the DUNS number blank during registration.

- **How do I complete registration if my username already exists?**

Answer: - This message means that you already have an Ariba Network, Ariba Discovery, or Ariba Sourcing supplier account registered under username you entered. You can either register ua new account by creating a new username, or access one of the following sites to request a password reset for the registered username:

- Ariba Network (This login page is used for all Ariba Network, Ariba Sourcing, or Ariba Contracts suppliers).
- Ariba Discovery login page

To reset your password, click the **Having trouble logging in?** Link on the Login page.

- **Nothing happens when I click Forgot Username and enter my email address**

Issue: - Nothing happens when I click the **Forgot Username** link and enter my email address.

Cause: - After you submit your request to retrieve your username, the Ariba Network sends an email notification with usernames that match the email address you submitted.

Some possible reasons why you may not receive this username retrieval email notification:

- The email address on your account does not match the email address you entered when submitting the request.
- Your buyer-specific account was deactivated before you could move it to the Ariba Commerce Cloud. Generally, that means you probably have not participated in an event with that buyer for a while.

Solution: -

- To ensure you receive this email notification:
- Make sure you type the email address configured within your account.

If your buyer-specific account has been deactivated, contact your buyer to determine how to proceed.

- **Where is my password reset email?**

Answer: - After you submit your request for a password reset, Ariba sends instructions to the email address associated with your account. If you didn't receive a password reset email, check the following scenarios to troubleshoot.

The username you entered is in the wrong format, or it isn't associated with the email address you are checking.

- Keep in mind, your username is in the format of a full email address, but it can be associated with any email address you entered previously.
- Your username is also case-sensitive.
- To confirm that you are using the correct username and format, return to the Ariba login page, and click the **Having trouble logging in?** link (**Forgot Username** if you're working in Ariba Discovery).
    - Choose **I forgot my username**, and click **Continue**.
    - Enter the email address associated with your account, and click **Submit**.
    - You will receive an email that lists the exact format of the username associated with the email you entered.

You entered the correct username, but you still didn't receive the password reset email notification.

- This can occur if the configured email address is different from the account you are checking.
- You might have multiple accounts for your company, so make sure you are attempting to access the correct account.

Your email configuration or company's security settings might also prevent you from receiving the password reset email. To find out, check your junk mail folder or email filter settings to verify that automated emails from Ariba are not blocked from your email account.

- **Why do I get this message on the SAP Ariba Login page: "The username and password pair you entered was not found"?**

Answer: - You entered an incorrect **Username** or **Password**. You might receive this message if you entered a previous **Username** or **Password**. Remember that your **Username** has the format of an email address, and both the **Username** and **Password** are case sensitive.

Click the **Having trouble logging in?** Link on the Login page if you don't remember your log in information.

-: Steps for tender submission:-

Step 1: Vendor will get an **invitation email** from Ariba System. Keep this email, it contains your login Information and a direct link to Ariba.

URL for Supplier Users: http://tatapower.supplier.ariba.com

Step 2: Click **"Click Here" to access this event.**

Step 3: If you are first time vendor you will get the **"Sign UP" window**. Click on the same. If this screen is not appearing then close the window and follow the steps.

If the vendor has already created User id and password then after step 2 he will directly get the login screen.After credentials →click on ARIBA APPS and click on Proposals.

Step 4: After Continue simple one-page registration screen will open. Define your password and secret question. Click "OK"

Step 5: You will be able to see the RFQ

Step 6: After review and downloading of all documents click on **"Review Prerequisites"**

Step 7: Review and accept **"Bidder Agreement".**

Step 8: Select Items or Lots →**Click "Submit Select Lots"**

Step 9: Vendor has to submit their **techno commercial offer in 2.1." Pls Attach Techno commercial Bid "**In this field Do No attach any price content.

For Price Bid put all the unit price and taxes and duties in provided field. Put "0" (ZERO) in not applicable field.

Step 10: After successfully putting Techno commercial offer and price part then click on **"Submit Entire Response"**