MADHYANCHAL VIDYUT VITRAN NIGAM LIMITED

HEAD OFFICE4-A, GOKHALE MARG, LUCKNOW:-226001

Phone No.: 0522-2207065, 2208737, email : seitmvvnl@gmail.com

CIN : U31200UP2003SGC027459

GSTIN – 09AAECM0108J1ZO

E- TENDER NOTICE

E-tenders are invited in Two parts, Part-I (Earnest money, confirmation of validity and Tender Cost, Techno-commercial) and Part-II (Price Bid) are invited, from the competent, experienced and financially sound contractors meeting the technical, financial requirement as mentioned in the bid document for the following works, to be carried out on turnkey basis including supply of material. The tenderer shall quote for the complete package.

TENDER SPECIFICATION NO. MEDCO/ 2558 /2021: -

Earnest Money	Rs. 5,49,000.00
Pre-Bid conference	20.02.2021 at 15:00 Hrs
Last Date & Time of receiving Tender	02.03.2021 at 13:00 Hrs.
Due date and time for opening Bid Part 1	03.03.2021 at 15:00 Hrs.

A. Brief description of works:

Empanelment of Facility Management Service Provider for Converting Single p`oint metering system into Multi point metering system in multi-storeyed building by using Single Source Single Register Or Dual Source Dual Register Two-Way Communicable Meters with advanced AMI on individual connections.

B. The bidding shall be on e-tendering basis. The tender document and price schedule shall be uploaded by the bidder Electronically on Uttar Pradesh e-tender portal https://etender.up.nic.in on due date and time for submission of bids. The detailed Pre Qualifying Requirements (PQR) will be provided in the Bidding Document. Bid document is available online on https://etender.up.nic.in as per particulars indicated below. Any changes in the Bid Schedule, corrigendum etc. shall also be notified via same website. Prospective bidders are therefore requested to regularly check the website for any updates.

C. Tender document fee of Rs. 6,000/-+GST@18%, (Rs. 7080/-) and EMD, shall be deposited in Bank Account of MVVNL **(GST No. 09AAECM0108J1Z0)** Bank Account no. **10101985738** and IFSC code **SBIN0003347** of State Bank of India, Ashok Marg Branch, Lucknow in name of **Executive Engineer to Managing Director, MVVNL** through NEFT/RTGS. EMD can also be submitted in the form of Bank Guarantee from any Scheduled Bank/ Nationalized Bank duly pledged in favour of **Executive Engineer to Managing Director, MVVNL** Payable at **Lucknow** also. Techno commercial and price part of any proposal shall not be opened in case the Earnest money is found to be insufficient or defective in any manner. In support of submission of Tender Fee Bank receipt with UTR no., Pay in slip original copy shall be uploaded online. In case EMD is submitted in form of Bank Guarantee, its scanned copy shall be uploaded online and Bank Guarantee original copy shall be sent to undersigned office so that it is received within three days of opening date of Part-I of the tender. Regarding this Bank Guarantee, issuing Bank confirmation letter is to be mailed to seitmvvnl@gmail.com before or at the time of opening of the tender. Entire tender offer and Technical & Commercial part shall be uploaded online on e-tender website https://etender.up.nic.in within scheduled date & time of the opening of the tender. Apart from EMD Bank Guarantee no hard copy is to be submitted, however on demand by MVVNL bidder shall make original copy of the Document available. Tender part-II (Price Bid) shall be uploaded as per online Tender BOQ on e-tender website https://etender.up.nic.in only. In case date of opening of tender happens to be Public Holiday, it shall be opened on next working day. Tender offer validity shall be of 360 days. In future in case of any amendment/revision in the tender document or extension in date of opening of the tender it shall be made available/uploaded on e-tender website https://etender.up.nic.in.

D. After evaluation of tender bid part-I (Techno commercial Part), the price bids (Tender Part-II) of qualified bidders will be opened at a date & time which will be intimated to them through a letter/E-mail.

E. Firms to whom notice(s) have been issued for the unsatisfactory performance for similar work or which have been blacklisted/debarred from business doing with MVVNL or any other DISCOM of UPPCL are not eligible to participate in the above tenders.

F. MVVNL reserves the right to reject the offer of any one or all the bidders without assigning any reasons thereof

Superintending Engineer (IT)

Address –MVVNL, 4-A, Gokhale Marg, Lucknow-226001

E-mail: seitmvvnl@gmail.com

Website: https://etender.up.nic.in

REQUEST FOR PROPOSAL(RFP) FOR

"Empanelment of Facility Management Service Provider for Converting Single point metering system into Multi point metering system in multistoried building by using

1. Single Source Single Register

or

2. Dual Source Dual Register

Two-Way Communicable Meters with advanced AMI on individual connections."

Tender No.: MEDCO/2558/2021

Volume-I

Purchaser:

MADHYANCHAL VIDYUT VITRAN NIGAM LTD., LUCKNOW

Office of the Superintending Engineer (IT), MVVNL, LUCKNOW

Disclaimer

The information contained in this Request for Proposal ("RFP") document or information provided subsequently to bidders or applicants whether verbally or in documentary form by or on behalf of MVVNL, is provided to the bidder(s) on the terms and conditions set out in this RFP document and all other terms and conditions subject to which such information is provided. This RFP document is not an agreement and is not an offer or invitation by MVVNL to any parties other than the applicants who are qualified to submit the bids (hereinafter individually and collectively referred to as "Bidder" or "Bidders" respectively). The purpose of this RFP is to provide the Bidders with information to assist the formulation of their proposals. This RFP does not claim to contain all the information each Bidder requires. Each Bidder may conduct its own independent investigations and analysis and is free to check the accuracy, reliability and completeness of the information in this RFP. MVVNL makes no representation or warranty and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of this RFP. The information contained in the RFP document is selective and is subject to updating, expansion, revision and amendment. It does not purport to contain all the information that a Bidder requires.

MVVNL does not undertake to provide any Bidder with access to any additional information or to update the information in the RFP document or to correct any inaccuracies therein, which may become apparent.

MVVNL reserves the right of discretion to change, modify, add to or alter any or all of the provisions of this RFP and/or the bidding process, without assigning any reasons whatsoever. Such change will be published Government procurement Portal http://etender.up.nic.in and it will become part and parcel of RFP.

MVVNL in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information in this RFP.MVVNL reserves the right to reject any or all the request for proposals received in response to this RFP document at any stage without assigning any reason whatsoever. The decision of MVVNL shall be final, conclusive and binding on all the parties.

Contents

Abbrevations

S/N	Abbreviation	Full Form
1	CE	Chief Engineer
2	CVC	Central Vigilance Commission
3	DISCOM	Distribution Company (MVVNL)
4	DT	Distribution Transformer
5	EVO	Estimated value of orders
6	FY	Financial Year
7	IEC	International Electrotechnical Commission
8	ISO	International Organization for Standardization
9	IT	Information Technology
10	JEN	Junior Engineer
11	MVVNL	MADHYANCHAL VIDYUT VITRAN NIGAM LTD
12	KPI	Key Performance Indicators
13	L1	Lowest one
14	LOI	Letter of Intent
15	LT	Low Tension
16	MIS	Management Information System
17	NC	No Current
18	RFP	Request for proposal
19	SAIDI	System Average Interruption Duration Index
20	SAIFI	System Average Interruption Frequency Index
21	SCADA	Supervisory Control and Data Acquisition
22	SE	Superintending Engineer
23	SLA	Service Level Agreement
24	AMC	Annual Maintenance Contract
25	POC CE	Proof of concept Chief Engineer

Tender No.: MEDCO/2558/2021

MADHYANCHAL Vidyut Vitran Nigam Ltd. ["MVVNL"/ "MADHYANCHAL Discom"] invites bids from competent Agency for work "**Empanelment of Facility Management Service Provider for Converting Single point metering system into Multi point metering system in multistoried building by using Single Source Single Register/Dual Source Dual Register meters with Advanced AMI on individual connections**".

Mode of Bid Submission	Online through e-Procurement/e-Tendering system at http://etender.up.nic.in
Tendering Authority	Superintending Engineer (IT) Madhyanchal Vidyut Vitran Nigam Ltd. 4-A, Gokhle Marg, Lucknow-226001
Contact Persons	1) Arvind Singh, SE (IT) Office: 0522-2208737 Email address-arvind@uppclonline.com 2) Nitish Kumar Mishra, EE (IT).
Submission of **Tender Document Fee (including GST @ 18%)** in form of RTGS/NEFT payable at Lucknow, Uttar Pradesh Account details for Online Tender Fee Submission A/c No.- **10101985738** IFS Code – **SBIN0003347** Account Name: Executive Engineer to Managing Director, MVVNL, Lucknow Bank- State Bank of India Bank Name: State Bank of India Branch Name and Address: Ashok Marg, Lucknow.	Rs: 7,080/- before 02.03.2021 upto 1 PM documentary proof should be uploaded alongwith tender document.

Submission of **Earnest Money through in** favour of Executive Engineer to Managing Director, MVVNL, Lucknow in the form of RTGS/NEFT or Bank Guarantee.	Rs. 5.49 LAKH before 02.03.2021 upto 13:00 documentary proof should be uploaded alongwith tender document.
Last Date of receipt Of clarification/queries**	Within 7 days from date of uploading of tender document Up to 14.00 pm
Submission Date for hard copy of Bank Guarantee for EMD.	The deadline for submission of these instruments is Bid Submission Deadline. The Bidder can submit these instruments before the deadline. The Bidder has to submit the same in hard copy and attach the scan of receipts with online bids.
Pre-Bid Meeting	20.02.2021 at 15:00 hrs
Bid submission Last Date/ Time	**02.03.2021 upto 13:00 hrs**
Date & Time of Opening of Technical Bids	**03.03.2021 AT 15:00 hrs**
Date of POC	18.03.2021
Date & Time of Opening of Financial Bids	02.04.2021
Website For Downloading Tender Document, Corrigendum's, Addendums etc.	http://etender.up.nic.in.
Bid Validity& EMD Validity	**Bid Validity:** 360 Days from the date of Technical Bid Opening **EMD Validity:** 360 days from date of Technical Bid opening. If required, the same shall be requested to be extended.

** The bidders are requested to furnish their comments in the following format:

Name of person with e-mail ID and contact number:	
Name of Prospective bidder:	
Experience Details:	
Comments/Suggestions in RFP:	
Clause Number	Suggestions/Comments

The prospective bidder should have the necessary competence, adequate financial standing, sufficient experience, expertise as per Qualification Requirement detailed in this document.
Before bidding under this bid, in order to avoid non-responsiveness of bid, bidder should ensure that:

1. They are qualified as per PQR mentioned in this document

2. The offered solution meets the scope and functional requirement laid down in this document.

Scope of Work is detailed out in the subsequent sections of the RFP NOTE:

1. The bid shall only be submitted through online tendering system of https://etender.up.nic.in

2. Bidders who wish to participate in this tender will have to register on https://etender.up.nic.in. To participate in online tenders, Bidders willhave to procure Digital Signature Certificate (Type – II or Type – III) as per Information Technology Act-2000 using which they can sign their electronic bids. Bidders can procure the same from any CCA approved certifying agency i.e TCS, Safecrypt, Ncode etc. or they may contact e-Procurement Cell, Department of IT & C, Government of Uttar Pradesh for future assistance. Bidders who already have a valid Digital Certificate need not to procure a new Digital Certificate**.**

Contact No. 0522-431 4011 (10.00 AM to 5.00 PM on allworking days)

E-mail: seitmvvnl@gmail.com

Address: MADHYANCHAL, Vidyut Vitran Nigam Limited, 4-A, Gokhle Marg, Lucknow-226001,

3. Bidders should go through the website https://etender.up.nic.inshould refer to the website and go through the link “Help For Contractors”, “Information About DSC”, “FAQ” and “Bidders Manual Kit” and **Section-I** to know the process for submitting the electronic bids at the website.

4. The ‘Instructions to bidders’ and other terms and conditions of this tender pertaining to the bidding process generally follow the guidelines of e-tendering system of the government of Uttar Pradesh, available at URL https://etender.up.nic.in However, wherever there is any anomaly between the conditions referred to in this tender document and the GoR e-tendering system, the latter shall be final.

5. The complete tender document has been published on the websites, https://etender.up.nic.in for the purpose ofdownloading.

6. The downloaded tender document shall be considered valid for participation in the bid process subject to submission of required Tender fees, e-Tender Processing Fee& EMD as mentioned in the NIT Section table. A copy of receipt of the tender fees, e-Tender Processing Fees & EMD must be enclosed along with the Technical bid/ proposal failing which the bid will be summarily rejected. The last date of submission of these Original instruments is mentioned in the NIT Table. The Bidder must take due care in submitting the instruments and collecting receipts from MVVNL Discom Lucknow so that the Originals are submitted in hard copy and receipt scans are uploaded with the Technical Bid, before the Bid Submission Deadline.

7. All the communication/ correspondence including the bid document (Technical and Financial Bid) should be signed digitally by the Bidder. The Technical and Financial Bid which is uploaded on eproc portal must be signed and stamped on each relevant page by the designated Authorized Representative of the bidder. The name, designation and authority of the designated Authorized Representative of the Bidder shall be stated in the Bid.

8. No contractual obligation whatsoever shall arise from the tender document/bidding process unless and until a formal contract is signed and executed between the purchaser and the successful bidder(s).

9. MVVNL disclaims any factual/ or any other errors in this tender document (the onus is purely on the individual bidders to verify such information) and the information provided herein are intended only to help the bidders to prepare a logical bid.

10. Bids will be considered only in the prescribed manner. Bids not submitted in the prescribed format will be summarily rejected without further evaluation.

11. Copies of various documents to be enclosed along with the bids must be legible and be self-attested by the authorized signatory with official seal. Claims made by bidder related to the project experience and other requirements shall be considered only when appropriate supporting documents are provided.

12. All the communication/correspondence including the Bid (Technical and Financial Bid) must be signed and stamped on each page by the designated Authorized Representative of the bidder failing which the bid will be summarily rejected.

13. The Bids can be submitted up to date and time given as specified in the NIT Table.

14. The complete bidding process is defined in the tender document.

15. In case, a bidder imposes conditions which are in addition or at variance or in conflict with the terms and conditions as specified in this tender document, all such bids will be summarily rejected.

16. Tendering Authority reserves the complete right to accept or reject in part or full any or all the bids without assigning any reasons whatsoever. No further discussion/ interaction will be held with the bidders whose bids have been disqualified/ rejected by the tendering authority.

17. In case, a dispute arises with regard to interpretation/ omission/ error in this tender document, bid submitted, other documents; the decision of SE (IT), MVVNL, LUCKNOW will be final and binding upon the bidders.

18. Interested bidders may obtain further information from the office of **The Superintending Engineer (IT), Madhyanchal Vidyut Vitran Nigam Ltd, Lucknow**.

Superintending Engineer (IT)

SECTION –I Introduction

1.1 About MVVNL

MADHYANCHAL VIDYUT VITRAN NIGAM LIMITED (MADHYANCHAL Discom) is an undertaking of Government of UP engaged in supply and distribution of electricity in the jurisdiction of MADHYANCHAL Discom in 19 districts of Budaun, Bareilly, Pilibhit, Shahjahanpur, Lakhimpur, Hardoi, Sitapur, Unnao, Bahraich, Shrawasti, Balrampur, Gonda, Barabanki, Rae Bareli, Ayodhya, Sultanpur, Ambedkarnagar, Lucknow And Amethi.,

1.2 Definitions

'Discom' or 'MVVNL' means MADHYANCHAL Vidyut Vitran Nigam Ltd.

'RFP' means this Request for Proposal prepared by Superindenting Engineer (IT) MVVNL for Converison of Single point metering to multipoint metering.

'Bidder' means a vendor submitting the proposal in response to this RFP.

'Contract' means the agreement signed by successful bidder and the Discom at the conclusion of bidding process, wherever required.

'Proposal' means that Technical/Financial proposal including any documents submitted by the bidder as per the formats prescribed in the RFP.

'Successful Bidder'/'L1 Bidder' means the Bidder/Entity that has bid the lowest in a tender out of all the pre-qualified bidders, subject to compliance to all the Terms and Conditions of the RFP, etc.

1.3 Objective of RFP

The main objective of implementing the bidirectional meter communication and remote data acquisition system is to acquire meter data automatically from different meters and for both sources (Utility power and DG), monitor important distribution parameters, provide meter data to billing system for accurate billing and reporting, generate and dispatch notification on any abnormal activity / parameter in the network and use the data for several other analytical applications.

SECTION –II Detailed Scope of Work

2.1 BOQ: -

Facility management cost would be applicable for initially for 3 years..

Sl. No.	Item Description	Qty.	Unit of Item	Unit Price	GST (as applicable)	Total Quantity Price inclusive of GST (in Rs. /No) (FMS for 5 Years)	Total Price (including GST)
1	One Time Activity: - Supply & Installation of Three phase, Four wire, whole current (10- 60amp) Single Source Single Register/Dual Source Dual register 2-way communicable electronic energy meter (Accuracy class-1). It also includes the Supply and Installation of CT Operated A.C. Three Phase Four Wire L.T, Tri-vector Smart Energy Meter of Accuracy Class 0.5S With Bi Directional Communication Facility, CT Operated A.C. Three Phase Four Wire L.T, Tri-vector Smart Energy Meter of Accuracy Class 0.5S With Bi Directional Communication Facility supply & creation of communication infrastructure viz DCU, HES & its integration with HCL System, Data security System etc. required for the successful operation of above metering System as per the technical specifications.	**2350**	**Nos.**			**0.00**	
2	One Time Activity: - Supply & Installation of Three phase, Four wire, whole current (10- 60amp) Single Source Single Register/Dual Source Dual register 2-way communicable electronic energy meter (Accuracy class-1). It also includes the Supply and Installation of CT Operated A.C. Three Phase Four Wire L.T, Tri-vector Smart Energy Meter of Accuracy Class 0.5S With Bi Directional Communication Facility, CT Operated A.C. Three Phase Four Wire L.T, Tri-vector Smart Energy Meter of Accuracy Class 0.5S With Bi Directional Communication Facility supply & creation of communication infrastructure viz DCU, HES & its integration with HCL System, Data security System etc. required for the successful operation of above metering System as per the technical specifications.	**235**					

3	One Time Activity: - Supply & Installation of Three phase, Four wire, whole current (10- 60amp) Single Source Single Register/Dual Source Dual register 2-way communicable electronic energy meter (Accuracy class-1). It also includes the Supply and Installation of CT Operated A.C. Three Phase Four Wire L.T, Tri-vector Smart Energy Meter of Accuracy Class 0.5S With Bi Directional Communication Facility, CT Operated A.C. Three Phase Four Wire L.T, Tri-vector Smart Energy Meter of Accuracy Class 0.5S With Bi Directional Communication Facility supply & creation of communication infrastructure viz DCU, HES & its integration with HCL System, Data security System etc. required for the successful operation of above metering System as per the technical specifications.	**259**					
4	Facility Management Services (Monthly Charges to be Quoted i.e., Per Consumer/Month) It includes day to day Maintenance of above metering system viz SIM Charges, Token generation for recharge of above prepaid meter, keeping the meters functional, sending meter data to the Billing system of MVVNL through MDAS & MDMS, energy accounting & auditing, generation of reports as per the requirement, all backend operations etc.(For First 3 Years)	**2350**	**Nos.**			**0.00**	
5	Facility Management Services (Monthly Charges to be Quoted i.e., Per Consumer/Month) It includes day to day Maintenance of above metering system viz SIM Charges, Token generation for recharge of above prepaid meter, keeping the meters functional, sending meter data to the Billing system of MVVNL through MDAS & MDMS, energy accounting & auditing, generation of reports as per the requirement, all backend operations etc. (For First Extension of 2 Years)	**2585**	**Nos.**			**0.00**	
6	Facility Management Services (Monthly Charges to be Quoted i.e., Per Consumer/Month) It includes day to day Maintenance of above metering system viz SIM Charges, Token generation for recharge of above prepaid meter, keeping the meters functional, sending meter data to the Billing system of MVVNL through MDAS & MDMS, energy accounting & auditing, generation of reports as per the requirement, all backend operations etc. (For Sencond Extension of 2 Years)	**2844**	**Nos.**			**0.00**	
Total in Figures							

2.2 Detailed Scope of Work

In Multistory Building Power is supplied from 2 sources, i.e., Grid Supply and DG (Diesel Generator)/Solar through the common infrastructure. The existing infrastructure/system does not provide a way to allocate Energy from two sources to individual consumer separately.

The Bidder has to provide one of the solutions from below: -

Solution 1

Dual source recording through existing Smart metering AMI solution, as per CEA guidelines and relevant Indian Standards, the Grid and DG supply recording can be done using power outage event with instantaneous reading parameters, Daily Block Load Profile, Daily Load Profile and Billing Profile.

The bidder's scope of work shall include, in complete conformity with subsequent sections of the specifications, site survey, planning, design, engineering, manufacturing, procure, supply, transportation & insurance, delivery at site, unloading, handling, storage, installation, integration, testing, commissioning, demonstration for acceptance, training, maintenance and documentation of:

I. AC Three phase SMART Energy Meters 10-60 Amp, Accuracy Class 1 with Pilfer proof meter box.

II. AC Three Phase SMART Energy LT CT Meter with Box with Pilfer proof meter box.

III. HT SMART Energy Meter with Box with Pilfer proof meter box.

IV. DCU/Gateway.

V. RF Mesh/ NBIoT/5G-4G-2G based communication:

Router/DCU based canopy type Radio Frequency (RF) network (based on Radio Frequency (RF) mesh Licensed frequency band as permitted by Wireless Planning & Coordination Wing (WPC) or in Unlicensed frequency band) (Wherever RF is not feasible (5G-4G-2G) based communication shall be established) for communication of data between field smart meters and the HES through DCU. The network should provide a medium for two-way communication between various nodes & Head End System (HES). Different nodes shall interconnect with each other using RF mesh network and they shall communicate with nearby routers/ DCU to transfer the data to access points/ HES. The following activities shall be performed to complete installation of RFCanopy:

a. Site survey for the installation of Smart Meters.

b. The Contractor has to assess and maintain buffer so that in case of new installation, smart meters are installed by the Contractor without anydelay

c. Site survey for selection of communication technology and telecomoperator.

d. Site Survey for identification of location for installation of routers/ / DCU andcollectors.

e. Noise Analysis of RF communication through softwaretools.

f. Deployment of Canopy elements viz. Routers and Collectors.

g. Wherever RF is not feasible (5G-4G-2G) based communication shall be established.

h. Data Concentrator Units / Routers if Required. Compatible with DISCOMS provided HES/MDM application which is separate for RAPDRP and Non- RAPDRP area.

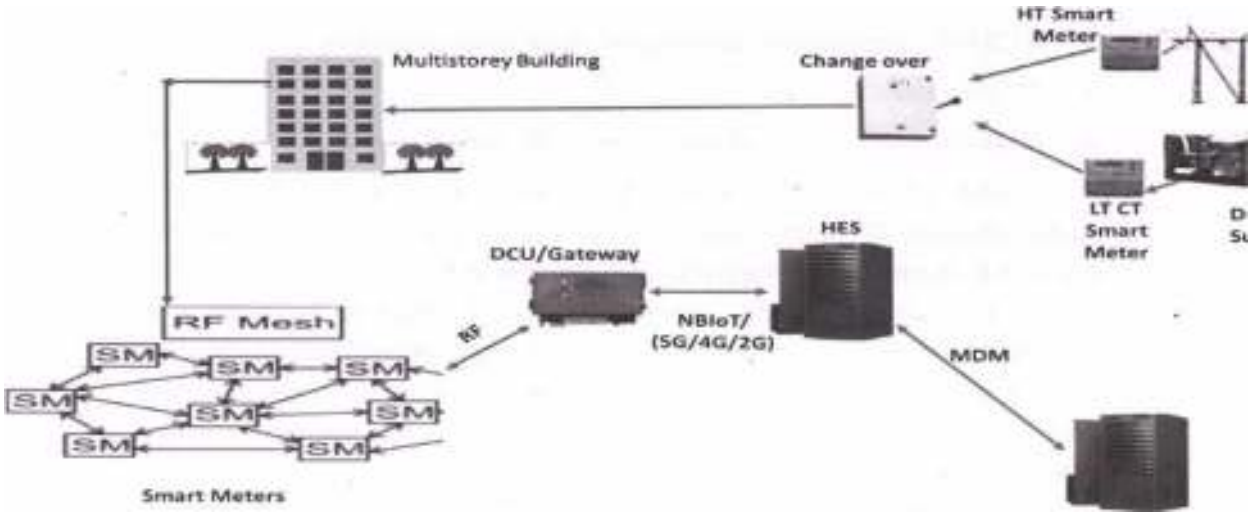
i. Integration with Head End System (HES) / Meter Data Acquisition System (MDAS) - The bidder should integrate meters with UPPCL's HES to obtain data from various end points .

System Architecture
Key Components-

The key components for this solution will be:

- Smart Meter with RF Mesh/ NBIoT/5G-4G-2G communication. Meter shall have provision for pluggable and interchangeable NIC (RF Mesh/ NBIoT/5G-4G-2G) i.e as per field based requirement NIC of either type can be used without changing the meter.
- HT smart Meter on Grid Supply Point and LT-CT smart Meter on DG set.
- A DCU/Gateway with RF Mesh/ NBIoT/5G-4G-2G Communication

- Head End Software (HES)
- Meter Data Management System(MDMS)



Working Topology -

- Smart Meters shall be capable enough to register Instantaneous Reading parameters (Cumulative KWh and KVAh) with every power Outage Event.
- The Smart meter shall communicate to DCU based on RF mesh network
- HES to receive Data from DCU on WAN through NBIoT communication technology with fallback arrangement to available communication technology in sequence of 5G-4G-2G, according to the predefined schedule (daily, monthly, hourly) configured.
- Reading of Grid and DG supply of individual consumer to be calculated based on power outage event with instantaneous Reading parameters, Daily Block Load Profile, Daily Load Profile and Billing Profile in MDM.

Solution 2:-

Dual source recording by installing a dedicated detection device at DG set and Grid, the said detection device will send the information as per condition mentioned in table 1 to DCU/Gatewaywhich will further broadcast to all the connected meters and accordingly the Grid register and DG register in Dual Register Smart Meter will be switched to corresponding mode.

DG	GRID	Signal
0	0	X
0	1	G
1	0	D
1	1	G

Note		
O-OFF	X-DO not send the signal	D-Send signal to switch to DG Register
1-ON	G-Send signal to switch to GRID Register	DEFAULT REGISTER OF DUAL SOURCE SMART METER -GRID REGISTER

Table 1

The bidder's scope of work shall include, in complete conformity with subsequent sections of the specifications, site survey, planning, design, engineering, manufacturing, procure, supply, transportation & insurance, delivery at site, unloading, handling, storage, installation, integration, testing, commissioning, demonstration for acceptance, training, maintenance and documentation of:

i. AC Three phase Dual Register SMART Energy Meters 10-60 Amp, Accuracy Class 1

with Pilfer proof meter box.

ii. AC Three Phase SMART Energy LT CT Meter with Box with Pilfer proof meter box.

iii. HT SMART Energy Meter with Box with Pilfer proof meter box.

iv. DCU/Gateway.

v. Dedicated detection device.

vi. RF Mesh/ NBIoT/5G-4G-2G based communication:

Router/DCU based canopy type Radio Frequency (RF) network (based on Radio Frequency (RF) mesh Licensed frequency band as permitted by Wireless Planning & Coordination Wing (WPC) or in Unlicensed frequency band) (Wherever RF is not feasible NBIoT/5G-4G-2G based communication shall be established) for communication of data between field smart meters and the HES through DCU. The network should provide a medium for two-way communication between various nodes & Head End System (HES). Different nodes shall interconnect with each other using RF mesh network and they shall communicate with nearby routers/ DCU to transfer the data to access points/ HES. The following activities shall be performed to complete installation of RFCanopy:

a. Site survey for the installation of Smart Meters.

b. The Contractor has to assess and maintain buffer so that in case of new installation, smart meters are installed by the Contractor without any delay

c. Site survey for selection of communication technology and telecom operator.

d. Site Survey for identification of location for installation of routers/ / DCU and collectors.

e. Noise Analysis of RF communication through software tools.

f. Deployment of Canopy elements viz. Routers and Collectors.

g. Wherever RF is not feasible NBIoT/5G-4G-2G based communication shall be established.

h. Data Concentrator Units / Routers if Required. Compatible with DISCOMS provided HES/MDM application which is separate for RAPDRP and Non- RAPDRP area.

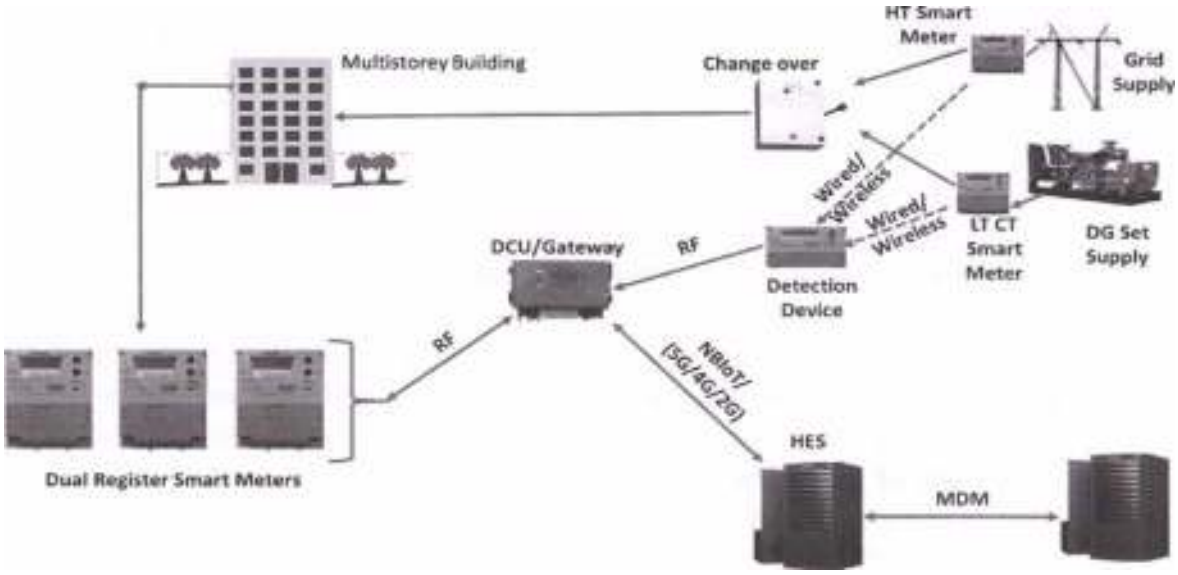
i. Integration with Head End System (HES) / Meter Data Acquisition System (MDAS) The bidder should integrate meters with UPPCL's HES to obtain data from various end points .

Key Components-

The key components of this solution will be:

- Dual Source Dual Register Smart Meter with RF Mesh/ NBIoT/5G-4G-2G communication. Meter shall have provision for pluggable and interchangeable NIC (RF Mesh/ NBIoT/5G-4G-2G) i.e as per field-based requirement NIC of either type can be used without changing the meter.
- Dedicated detection device.
- HT smart Meter on Grid Supply Point and LT-CT smart Meter on DG set.
- A DCU/Gateway with RF Mesh/ NBIoT/5G-4G-2G Communication
- Head End Software (HES)
- Meter Data Management System(MDMS)

System Architecture



Working Topology -

- Smart Meters shall be capable enough to register dual supply of Power by having separate register for both the supply sources.
- Installing Dedicated detection device at DG set and Grid,the said detection device will send the information as per condition mentioned in table 1 to DCU/Gateway which will further broadcast to connected meters and accordingly the Grid register and DG register in Dual Register Smart Meter will be switched to corresponding mode.
- DCU/Gateway to be programmed to Pull Data out of the Meters periodically as per requirement and send the data to HES.
- HES to receive DCU/Gateway Data from remote location, according to the predefined schedule (daily, monthly, hourly) configured.

2.2.1 **Warranty of newly installed System**

Warranty period for hardware shall be 3 years from the date of completion. After 3 years, warranty would be covered under FMS.The bidder would provide a complaint redressal system so that in case of any fault or issue in meters, they can be replaced / repaired within reasonable time. All the accessories required for the healthiness of infrastructure would be under scope of work. All the Required material during warranty period will be provided by Bidder.

This activity also includes any other small consumables/hardware required suitable to site conditions.

2.2.2 Infrastructure to be deployed at the central location as Backup

The bidder shall deploy the requisite hardware like meters, CTs, inbuilt CT boxes, cables and related accessories at a central location to be considered as backup location other than hosting place.

2.2.3 Further Details/Requirements.

I. Before proceeding with the execution of the aforesaid work, the Bidder shall fully familiarize himself with the site conditions. It shall be the responsibility of the Bidder to arrange all inputs required for detailed engineering and execution. The Bidders are advised to visit the sites, collect all necessary inputs and acquaint themselves with the topography, infrastructure etc. The Contractor shall be fully responsible for providing all equipment, materials, system and services specified or otherwise which are required for complete implementation. Test Instruments, Spares and Training as per tender specifications.

II. The Bidder shall also be responsible for the overall co-ordination with external agencies, project management, loading, unloading, handling, transporting to final destination for successful implementation for Discoms as per the scope of work detailed in the tender Documents.

III. In addition to above, following shall also be covered under the scope in the manner mentioned hereunder.

a. The number of consumers may increase/decrease during the execution period of project. All the equipment and associated items required for such works may increase/decrease accordingly shall be supplied & erected/commissioned. During the completion period.

Although all precautions have been taken to prepare this specification, the detailed specifications may have contradictory provisions or redundant provisions at different clauses. In such cases the specifications clause, which is beneficial to Discom, shall be considered for the interpretation.

2.2.4 Project Management Schedule and Documentation:

I. **Project Management:** The bidder shall assign a project manager with the authority to make commitments and decisions that are binding on the Contractor. Purchaser will designate a project manager to co-ordinate all purchaser project activities. All communications between purchaser and the Contractor shall be coordinated through the project managers. The project managers shall also be responsible for all communications between other members of the project staffs.

II. **Project Schedule:** The project implementation schedule is from date of detailed order. Based upon this schedule the bidder shall submit a preliminary implementation plan along with the bid. The detail project implementation schedule shall be submitted by the contractor after award for purchaser's approval, which shall include at least the following activities:

a. Site Study

b. Documents submission and approval schedule.

c. Factory & Site Testing Schedule.

d. Installation schedule.

e. GTP/Drawing of material for approval by SE(IT), MVVNL.

f. The project schedule shall include the estimated period for completion of and its linkage with other activities.

2.2.5 INCEPTION REPORT: In order to ensure the better execution of the proposed work in a scientific and managerial way, the bidder shall furnish an inception report within 15 days of awarding the contract. The inception report shall contain the following:

i. Detailed methodology/ project report/ modus operandi to be adopted to execute the contract.

ii. Resources with list of man power to be deployed to execute the contract

iii. Detailed list of inputs to be required from the Discom.

iv. Cleary spell-out the obligation to be completed for execution of the work.

v. Detailed Functional design & specification of the equipment's to be installed at every location with GTP (Guaranteed Technical Particulars)/Drawing.

vi. Testing procedure as per the relevant clause of the specification.

vii. Break up of total time schedule allowed for completion of supply in Gantt chart. The Gantt chart shall include milestone of approval of types and makes.

The Discoms on receipt of the inception report will furnish its recommendation for any modification, if required, within 15 days of receipt the same. If no communication is received from the Discoms within the stipulated period it shall be presumed that the inception report is in order and you may go ahead to start the work accordingly.

SECTION–III Qualification requirements (QR)

The Bidder must possess following credentials prescribed as Pre-Qualification Criteria. If any bidder fails to fulfil the Qualification Requirement (QR), his bid will be treated as non-responsive and no further correspondence/clarification will be taken into consideration for the same.

Note:

1. In case of non-furnishing the requisite documents along with the bid, the bid will be considered as non-responsive and bid may be summarily rejected.

2. Irrespective of meeting the above qualification requirements, none of the consulting companies engaged by MADHYANCHAL Discom as on date for IT Projects can bid for this tender.

Pre-qualifying requirement for the bidders

Sl. No.	Minimum Eligibility Criteria	Documents to be submitted
1	The Bidder should be a registered Indian legal entity under the Indian laws	Certificate of Registration as Company or Firm registered in India
2 **2.1**	The bidder should have Minimum Average Annual Turnover INR 1.5 Crore for last 3 years. OR In case of joint venture maximum two partners should be allowed wherein all partners should jointly meet the requirement of Para-2.	Audited financial statements for the immediate last 3 financial years along with CA Certificate.
3	Net Worth of last 3 financial years should be positive.	Audited Balance sheet (P&L) statements for last 3 financial years along with CA Certificate.
4	Liquid assets (LA) and/or evidence of access to or availability of fund-based credit facilities	Bidder shall have liquid assets (LA) and/or evidence of access to or availability of fund-based credit facilities of not less than Rs. 1 Cr.
5	The bidder should have provided the Facility Management services for HES driven smart metering/Pre-paid smart metering to at least 1,000 No. of Dual Source Energy Metering nodes using 4G and RF technologies in residential group housing. Work order and completion certificates needs to be submitted by the bidder. The bidder has to give the live demonstration of successful running of such projects to the technical evaluation committee of MVVNL & based on the report of technical committee & above requirement, the bidder shall be considered as technically qualified.	Bidders shall be required to submit the documentary evidence in support of having required experience of having executed the project viz. copies of contracts etc. and operational certificate of completion of work.
6	The bidder must have at least 10 full time IT/ELECTRICAL professionals who have been regularly working for a period exceeding one year with the bidder's firm and should	Relevant supporting documents to be attached (EPF/ESI Receipt/List of Employee with qualification).
7	Bidder should not have been blacklisted in any government organization in India	Undertaking for the same
8	In case of joint venture lead partner should be clearly mention.	Power of attorney should be attached for lead partner.

Sl. No.	Minimum Eligibility Criteria	Documents to be submitted
9	Bids should be for latest models and should not include models, which are marked to be withdrawn (End of Life) during the next 12 months and end of support for next 60 Months.	Self Declaration (Individual firm or by lead partner in case of JV)
10	Bidder should be able to place dedicated service engineers so that the post Sale call /complaint can be resolved in minimum time as possible.	Self Declaration (Individual firm or by lead partner in case of JV)
11	Class –A Electrical Certificate of Government.	Class- A Electrical Certificate Need to be submitted.

Technical Bid Evaluation-

Depending on the evaluation methodology mentioned above, Bidder should have to Qualify each condition of Pre-Qualifying requirement as mentioned above. It is clarified that the offer of those bidders who do not qualify the above requirement shall not be entertained and the same shall be considered as disqualified.

SECTION –IV, INSTRUCTION TO BIDDER

4.1 GENERAL INSTRUCTIONS

Tendering authority will receive bids in respect of services as set forth in the accompanying Tender document.

All bids shall be prepared and submitted in accordance with terms and conditions of this Tender Document.

The Bidder, in his own interest is requested to read very carefully these instructions and the terms and conditions as incorporated in General Conditions of Contract and Technical specification before filling and submitting the Bids.

If the bidder has any doubt as to the meaning of any provisions or any portion thereof, he shall before submit the Bid, may refer the same to the Tendering Authority in writing, well in time before the specified date of opening of Bids so that such doubts may be clarified.

Submission of the Bid shall be deemed to be the conclusive proof of the fact that the Bidder has acquainted himself and is in agreement with all the instructions, terms and conditions governing this Tender document unless otherwise specifically indicated/ commented by him in his Bid.

Bids submitted after the time and date fixed for receipt of bids as set out in the invitation to Bid shall be rejected and returned to the bidders.

The works referred herein shall cover the entire scope of the proposal which include conversion of single point to multipoint metering of multistory buildings.

4.2 Areas for Multipoint Metering

Multistory Buildings opted for conversion from single point metering to multipoint metering. No claim from Bidder or Agency for change in the bid or terms & conditions of the contract shall be entertained on the ground that the conditions are different than what were contemplated by them at the time of submitting the bids.

4.3 SUCCESSFUL IMPLEMENTATION AND GOOD PERFORMANCE

Any work if specifically, not mentioned but reasonably implied for the successful implementation and good performance of the proposed work is deemed to be included and has to be executed within the ordered price.

4.4 PREPARATION OF BIDDING DOCUMENT

(i) Earnest Money Deposit (EMD)

a. Tenderer is required to deposit earnest money as specified in the tender notice for full tendered quantity. There shall be no exemption from earnest money, even if the Tender is registered with DGS & D, Store Purchase Section of U.P. or U.P. Small Scale Industries. The earnest money shall be accepted in any of the following forms only.
b. RTGS/NEFT in favour of Executive Engineer to Managing Director MADHYANCHAL Vidyut Vitaran Nigam Limited, Lucknow in the designated bank account above.

OR

c. Bank Guarantee from a scheduled/Nationalized Bank in India, executed on a non-judicial stamp, of requisite value (at present Rs. 100/- as per U.P. Stamps Act STRICTLY on the specified proforma appended with form 'B' (only applicable when amount of earnest money exceeds Rs 5000/-). **The validity of the Bank guarantee would not be less than 360 days from the date of tender opening plus claim period of 6 months.Any deviation or addition/deletion from the text of the specified proforma of Bank Guarantee/inadequate value of stamp paper shall**

render the Bank Guarantee invalid for the purpose of opening of tender Bid Part-II.

d. **Offers without proper earnest money and/or a letter confirming the validity for 360 days shall not be considered under any circumstances.** The earnest money shall be refunded after, award is finalized. The earnest money of successful tenderer shall however be retained will such time he deposits security.

(ii) Tender Document Fee & Tender Processing Fee

a. The bidders are permitted to download the bid document from websites https://etender.up.nic.in, but must pay the cost of Tender document fee and e-Tender processing fee as mentioned in NIT table within the stipulated date & time in the office of Executive Engineer to MD, MVVNL, Lucknow and obtain acknowledgement thereof.

4.4 CLARIFICATIONS AND AMENDMENTS & DEVIATION FROM TENDER DOCUMENT

(i) CLARIFICATIONS TO THE TENDER DOCUMENT

Verbal clarifications and information given by the Discom or his employee(s) or his representative(s) shall not in any way be binding on the owner.

The bidder is required to carefully examine the Terms & Conditions including specifications of this Tender document and fully inform himself as to all the terms and conditions which may in any way affect the Work or the cost involved thereof.

(ii) CLARIFICATIONS TO THE BID

To assist in the examination, evaluation, comparison and post qualification of the bids, the Tendering Authority may, at its discretion, ask any bidder for a clarification of his bid. The Tendering Authority's request for clarification and the response shall be in writing or e-mail of the Authorized Signatory of the Bidder.

Any clarification submitted by a bidder with regard to his bid that is not in response to a request by the Tendering Authority shall not be considered.

No change in the prices or substance of the bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the tendering authority in the evaluation of the Bids

(iii) AMENDMENT OF TENDER DOCUMENT

At any time prior to the deadline for submission of the Bids, if the Tendering Authority deemed it necessary to amend the Tender document, it shall do so by issuing appropriate Corrigendum/Addendum.

Any Corrigendum/Addendum issued shall be a part of the Tender document and shall be published on the website of MADHYANCHAL Discom& e-proc portal.

To give prospective Bidders reasonable time to take a Corrigendum/Addendum into account in preparing their Bids, the tendering authority may, at its discretion, extend the deadline for the submission of the Bids.

Any change in date of submission and opening of bids would be published through MADHYANCHAL Discom's website and e-proc portal.

(iv) DEVIATION FROM BID DOCUMENTS

The bidder should comply all requirements set out in the bidding document and NO TECHNICAL and COMMERCIAL Deviation shall be entertained.

The Bids with Deviation from the requirement laid down in this document shall be considered as NON-Responsive.

The offer must have 'No Deviation' certificate as attached with bid document.

4.5 SUBMISSION AND OPENING OF BIDS

(i) COST OF BIDDING

The Bidder shall bear all the risks and costs associated with the preparation and submission of its Bid, and the Tendering Authority shall not be responsible or liable for those risks and costs, regardless of the conduct or outcome of the bidding process.

(ii) LANGUAGE OF BIDS:

The Bid, as well as all correspondence and documents relating to the Bid exchanged by the Bidder and the Tendering Authority, shall be written only in English Language. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in English, in which case, for purposes of interpretation of the Bid, such translation shall govern.

(iii) BIDS ARE TO BE SUBMITTED IN TWO PARTS

The Bid shall be submitted within the specified time on https://etender.up.nic.in in electronic format in the following manner**:**

Part- A (Technical Bid): will contain

a) Cover 1: Fees (to be uploaded in pdf format)
   (i) Copy of receipt of submission of Tender document fees
   (ii) Copy of receipt of submission of EMD (RTGS/NEFT/BG)

b) Cover 2: Techno-Commercial Bid (to be uploaded in pdf format):
   (i) Complete Technical Bid comprising information in specified formats and schedules (Except the price schedule) including details & design of the proposed system(s) to meet out the work requirement together with its capabilities.
   (ii) Supporting documents to ascertain the eligibility / qualification as per the QR requirements of this tender

   The Tendering Authority may require any bidder to furnish the documents in original or copy duly attested by Notary as the case may be for verification, in physical form on short notice of three working days.

Part- B (Financial Bid): will contain

a) The Financial Bid is to be submitted in excel file of BOQ.
b) Bids would be evaluated for (3+2+2) years assuming there is 10% quantity variation on each extension including the escalation sought.

Note: -

- The Financial Bid shall be for the scope of work defined for this project.
- The Financial Bid will be opened only for the Bidders shortlisted on the basis of Technical Bid.
- The date of opening of such Financial Bids will be intimated on the eprocurement website

4.6 SUBMISSION OF PROPOSALS

Bidder shall submit their bid in electronic format, which shall be digitally signed and further signed & stamped on each page by the designated authorized representative of the Bidder. Bidder shall procure Digital Signature Certificate (DSC) as per the provisions mentioned in Note 2 of the NIT table.

Physical submission of bids is not allowed. If asked by Tendering Authoritythe bidder is required to submit original technical bid in hardcopy which shall be the exact replica of online bid submitted. In case of any discrepancy between online and hardcopy Bid, the Bid submitted online shall prevail.

(i) FILLING OF BIDS

a. Bids shall be submitted on e-portal with the formats and schedules given in the Tender document duly filled in. The completed formats and schedules shall be considered as part of the contract documents in case the same Bidder becomes Successful Bidder. The Bids which are not in conformity to the schedules and formats of the Tender document, may not be considered.

b. No alteration should be made to the format and schedules of the tender document. The Bidder must comply entirely with the Tender document.

c. Tender should be filled in only with ink or typed and must be submitted online after signing digitally.

d. All additions, alterations and over-writing in the bid must be clearly signed by the authorized representative of the bidder otherwise bid shall be summarily rejected.

e. The bidder must quote the prices strictly in the manner as indicated herein, failing which bid is liable for rejection. The rate/prices shall be entered in words as well as in figures. These must not contain any additions, alterations, over-writing, cuttings or corrections and any other marking which leave any doubt and further may result in rejection of such Bid.

f. The Tendering Authority will not be responsible to accept any cost involved in the preparation or submission of bids.

g. All bids and accompanying documents shall be addressed to SE(IT), MADHYANCHAL Discom.

(ii) ALTERNATIVE BIDS

a. Alternative bids shall not be considered at all.

(iii) BID PRICES

This section would prevail over others any mentioned anywhere in the bid

a. All the prices should be quoted only in Indian Rupees (INR) Currency.
b. Bids would be evaluated for (3+2+2) years assuming there is 10% growth(assumptive) on each extension as mentioned in BOQ
c. The bid prices would remain firm in 3 buckets.
a. First 3 year
b. First extension for 2 years
c. Second extension for 2 years
d. But during extension the prices quoted may be rationalized +/- based
a. on any index such as inflation/bank rate
b. which would prevail at the start of such FY in respected of base order FY.
c. For bid evaluation it would treated as 1 for all buckets ie quoted price would remain same.
e. The FMS/bucket period may be curtailed/extended for each bucket period for mid period installations for sake of uniformity.
f. This is running contract.
g. if quantity exceeds by more than 50% in each bucket, 30% of reduction of unit rates per 50% increase would be applicable.

h. All installation would complete with 3 months of notification.
i. Arbitration would be carried out as latest applicable arbitration Act applicable. The place of arbitration would be in Lucknow.
j. Law governed in the courts in Uttar Pradesh alone shall have exclusive jurisdiction.
k. Minimum wages should be followed.
l. SLA would specifically be defined mutually after Letter of award based on the MIS.
m. If SLA breach is more than 10 % in continuous 3 months PBG may be invoked.
n. SLA breach Building wise would also be accounted.
o. Notice period for contract would be 30 days.
p. Proprietary items should not be used.
q. Only open protocols would be used.
r. The system should be designed such that other vendors may also take the system.
s. Sufficient Training would impart to run the system even in the absence of vendor.
t. All the equipment's/system installed would be under warranty or FMS DISCOMS would not be liable for any.

u. The prices quoted in BOQ.xls should be exclusive of GST and other government levies as applicable. The present rates of applicable taxes shall be indicated by the bidder in its Bid, which is subject to statuary variation and shall be borne by Discom.

v. The bidder will furnish the break-up of the quoted price in Financial Bid according to the *Format for Financial Bid Submission*, indicating rate and type of each tax clearly, as per the rates prevailing within 7 days before the bid date. Any statuary variation and imposing of new tax by government subsequent to bid submission/currency of Contract shall be on actual bais.

w. The quantity of conversion of single point to multipoint Metering under scope mentioned against DISCOMs is on average basis and may increase or decrease, however the payment shall be made as per the actual work made during the month.

4.7 PERIOD OF VALIDITY OF BIDS

The bid validity period is provided in the table mentioned in the NIT section. Bids mentioning a shorter validity period than specified are likely to be summarily rejected.

Tendering Authority may ask for extension in validity period. The Bidder will be at liberty to accept it or not. In case Bidder agrees to extend the validity period without changing his original offer, he will be required to extend validity period of the Bank Guarantee submitted against the EMD suitably.

4.8 SIGNATURE OF BIDDER

The bid must contain the name, address and place of business of the Bidder and must be signed and sealed by the designated Authorized Representative of the Bidder. The name of such person should also be typed or printed below the signature.

Bid by a partnership firm must be furnished with full names of all partners.

Bids by corporation/ company must be signed by the Authorized representative of the Bidder with the legal name of the corporation/ company.

Satisfactory evidence of authority (Power of Attorney) of the person signing on behalf of the Bidder shall be furnished with the bid.

The Bidder's name stated on the proposal shall be exact legal name of the firm. Bids not conforming to the above requirements of signing shall be disqualified.

4.9 DELAY IN BID SUBMISSION

The tendering authority shall not consider any bid that arrives after the deadline for submission of bids as indicated in the NIT. Any bid received by the tendering authority after the deadline for submission of bids shall not be accepted.

4.10 RECEIPT OF BIDS

Bids shall only be received through https://etender.up.nic.inwebsite.

4.11 WITHDRAWAL, SUBSTITUTION AND MODIFICATION OF BIDS

A Bidder may substitute or modify its bid after it has been submitted before the deadline prescribed for submission of bids as per the e-tendering process but bidder cannot withdraw his bid after submitting it once.

4.12 BID OPENING

MADHYANCHAL Discom shall perform the Bid opening at the specified place, date and time in the presence of bidders or their authorized representatives who may choose to be present.

Only the bids of those bidders who qualifies post the Technical Bid evaluation shall be eligible for Financial Bid opening. The date and time of Financial Bid opening to the technically qualified Bidders would be intimated later.

4.13 EVALUATION AND COMPARISON OF BIDS

The evaluation of bids will be made in the following two stages:

1st stage: Technical Bid Evaluation –

a. **Qualification Requirement -** Each bid shall be evaluated to ascertain thequalification of bidder with respect to the requirements laid down in this RFP.
b. **Technical Proposal -** Technical proposal shall be complete in all respect asmentioned in Technical Proposal section of this document. Incomplete bids will be treated as Non-Responsive.

The bidders who qualify the stage 1 shall be short listed for opening of financial offer.

2rd Stage: Financial Bid Evaluation

a. The Financial Bids which are opened shall be evaluated.
b. The Purchaser will correct arithmetical errors during evaluation of Financial Bids on the following basis:
    (i) If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected;
    (ii) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
    (iii) If there is a discrepancy between words and figures, the amount in words shall prevail. However, where the amount expressed in words is related to an arithmetic error, the amount in figures shall prevail subject to (i) and (ii) above.
    (iv) If there is a discrepancy between percentage and figures related to various taxes or levies, the percentage shall prevail over figure mentioned. However, where the amount expressed in percentage is related to an arithmetic error, the amount in figures shall prevail subject to (i) and (ii) above. It should also

be noted that at time of payment against, the prevailing tax/levy rates will be used as on the date of approval of payment.

(v) Except as provided in sub-clauses (i) to (iv) herein above, Tendering Authority shall reject the Price Proposal if the same contains any other computational or arithmetic discrepancy or error.

c. If the Bidder does not accept the correction of errors, its Bid shall be disqualified and its EMD shall be forfeited

d. The bids will be evaluated and awarded as per the evaluation criteria that "The Bidders having lowest financial quote during Financial Bid Evaluation shall be considered as the L1 Bidders".

e. The EMD of the other technically qualified Bidders shall be returned within 15 working days from the date of signing of Contract by the Discom with the successful Bidder.

4.14 CONFIDENTIALITY

Information relating to the examination, evaluation, comparison, and post qualification of Bids, and recommendation of contract award, shall not be disclosed to Bidders or any other persons not officially concerned with such process until publication of the Contract award.

Any attempt by a bidder to influence the tendering authority or other officials of Discom in the examination, evaluation, comparison, and post qualification of the Bids or Contract award decisions shall result in the rejection of his bid.

From the time of Bid opening to the time of Contract award, if any Bidder wishes to contact the Tendering Authority on any matter related to the Bidding process, he is allowed to do so in writing.

4.15 NON-MATERIAL NON-CONFORMITIES

Provided that a bid is substantially responsive, the Tendering Authority, to rectify omission in the bid related to requisite documents may request the bidder to submit the necessary information or documentation provided that the required information was in existence as on date of opening of bid. No new information created after opening of bid shall be considered.

4.16 DISQUALIFICATION

Tendering authority may at its sole discretion and at any time during the processing of bid, disqualify any bidder/ bid from the bid process on following grounds:

(i) Any action on the part of the bidder to revise the rates/prices and modification in technical or commercial substance of Bid, at their own.

(ii) Submission of any supplementary information unless & otherwise asked for at his own instance after the opening of the Bid may result in rejection of the Bid and also debar him from submission of Bid to the Discom at least for one year.

(iii) In case of bidder not adhering to the format of financial offer given with this document the bid / offer may be rejected / non-responsive.

(iv) In case of any misapprehension at bidder level which may lead to wrong price bidding, Discom reserve the right to reject the bid or take necessary loading / unloading to arrive the correct price as per aspersion of Discom / tender specification. Accordingly, the bidders are advised to ask to clarify about any misapprehension before bidding. No excuse shall be considered in this regard.

(v) Does not meet the Qualification Requirement (QR) as mentioned in the bidding document.

(vi) During validity of the bid or its extended period, if any, increases his quoted prices.

(vii) Has imposed conditions in his bid.

(viii) Has made misleading or false representations in the forms, statements and attachments submitted in proof of the eligibility requirements.

(ix) Has submitted bid which is not accompanied by required documentation and EMD/Tender document fees/Processing fees.

(x) Submission of incomplete or vague technical proposals will be treated as Non-Responsive.

Note: *Bidders may specifically note that while processing the bid documents, if it isfound, expressly or implied, that some bidders may have compounded in any manner whatsoever or otherwise joined to form a cartel resulting in delay/ holding up the processing of bids then the bidders so involved are liable to be disqualified for the contract as well as for a further period of two years from participation in any of the bids floated by any department, Govt. of Uttar Pradesh.*

4.17 AWARD OF CONTRACT

a. After the selection of the Successful Bidder by the Tendering Authority within the validity period of Bid, shall inform such Bidder in writing by issuing Letter of Intent (LOI).

b. The Successful Bidder shall send an acknowledgement the LOI to the Discom, post which Discom shall prepare and send a detailed work order to the Successful Bidder.

c. Discom shall issue Work Order to the Successful Bidder requiring him to do the following things within specified timeline. If the Bidder fails to do the following things within specified timeline, EMD of such Bidder may be forfeited and Tendering Authority of Discom may consider the next ranked bidder.

   (i) Written Letter of Acceptance of Work Order along with duly signed and sealed copy of such Work Order as token of such acknowledgement within 7 working days.

   (ii) Submission of Performance Guarantee as required to be submitted under the Contract within 15 working days.

   (iii) Signing of the Contract (based on the terms & conditions of this Tender Document) with the Discom within 15 working days after issue of Contract format by Discom to the Successful Bidder. In case any of the party (Discom and the Successful Bidder) is unable to sign the Contract within 15 working days, it shall inform the other party in advance regarding the same along with the reason and suitable time for signing of the Contract.

d. Decision on bids shall be taken within original validity period of offers. If the decision on acceptance or rejection of a bid cannot be taken within the original bid validity period due to unavoidable circumstances, all the bidders shall be requested to extend validity period of their bids up to a specified date. It is discretion of bidder to accept the extension or not. Those bidders who do not accept shall be discontinued from the bid process and their EMD may be refunded.

e. Until a formal Contract is prepared and signed, the Work Order/ LOI shall constitute a binding Contract.

4.18 SIGNING OF CONTRACT

The successful bidder will, on receipt of Work Order from the Discom enter into a contract with the DISCOM by jointly signing the Contract.

The Contract will be signed within fifteen days thereafter. The person to sign the Contract must be duly authorized by the Bidding entities.

4.19 RESERVATION OF RIGHTS

To take care of unexpected circumstances, Tendering Authority shall reserve the rights for the following:

(i) Extend the last date & time for submission of the bids.

(ii) Amend the Tender Document at any time prior to the last date & time of submission of Bids.

(iii) To reject any bid without assigning any reasons.

(iv) Terminate or abandon the bidding procedure or the entire project whether before or after the receipt of bids.

(v) Seek the advice of external consultants to assist MADHYANCHAL Discom in the evaluation or review of bids.

(vi) Make enquiries of any person, company or organization to ascertain information regarding the bidder and its bids.

(vii) Reproduce for the purposes of the procedure the whole or any portion of the bids despite any copyright or other intellectual property right that may subsist in the bids.

Note: Direct or indirect canvassing on the part of the Bidder or his representative would be a ground for disqualification of such Bidder from this process.

4.20 GENERAL

a. Discom does not bind itself to accept the lowest or any bid or any part of the bid and shall not assign any reason(s) for the rejection of any bid or a part thereof.

b. The fact of submission of bid to the MADHYANCHAL Discom shall be deemed to constitute an agreement between the Bidder and the Discom whereby such bid shall remain open for acceptance by the Discom and Bidder shall not have option to withdraw his offer, impair or derogate the same. If the Bidder is notified during the period of validity of bid that his bid is accepted by the Discom, he shall be bound by the terms of agreement constituted by his bid and such acceptance thereof by the Discom, until formal contract of the same bid has been signed between him and Discom in replacement of such agreement.

c. The successful bidder will have to sign the contract agreement for the proper fulfilment of the contract. In case of ambiguous or contradictory terms and conditions mentioned in the Tender Document/ Bid, interpretations as may be advantageous to Discom may be taken, if satisfactory clarification is not furnished within the prescribed period.

d. Discom will not be responsible for any cost or expenses incurred by the bidder in connection with preparation or submission of bids.

e. MADHYANCHAL Discom reserves the right to:

   a. Reject or accept any bid.
   b. Cancel the bid process and reject all applications.
   c. MADHYANCHAL Discom shall neither be liable for any action nor be under any obligation to inform the bidders of the grounds for any of the above actions.

4.21 SPECIAL CONDITIONS of TENDER

a. If the services of the vendor are not as per the awarded work for three consecutive months after commencement of work then Discom will have liberty to terminate the contract.

b. Reporting tools for generation of MIS, Reports, Dashboards to help DISCOM Officers and Management for monitoring and in taking decisions for optimizing operations and enhancing customer satisfaction etc.

SECTION –V Terms and Conditions

The Terms and Conditions of the contract shall prevail and shall be binding on the Agency and any change or variation expressed or impressed howsoever made shall be in operative unless expressly sanction by the MADHYANCHAL Discom. The Bidder shall be deemed to have fully informed himself and to have specific knowledge of the provisions under terms and Conditions of this Tender Document mentioned hereunder:

6.1 DEFINITION OF TERMS

1. In constructing these general conditions and the annexed specification, the following words shall have the meaning here in assigned to them unless there is anything in the subject of context in consistent with such construction. “MADHYANCHAL Discom” shall mean the Madhyanchal Vidyut Vitran Nigam Limited or MVVNL, represented by Chairman/Managing Director and shall include their legal personal representative, successors and assignees.

2. The ““Bidder” shall mean and include one or more persons or any firm or any company or body in corporate who has submitted the tender in response to “Invitation of Tender”.

3. The “Agency / Contractor / successful bidder ” shall mean the Bidder whose Bid has been accepted by Discom and shall include its heirs, legal representative, successors and assignees approved by the Discom.

4. The “Chairman/Managing Director” shall mean the Chairman/Managing Director, Discom.

5. The “Engineer” shall mean the Chief Engineer, Dy. Chief Engineer, Superintending Engineer, Executive Engineer, Assistant Engineer, Discom or other Engineer or Officer for the time being or from time to time duly authorized and appointed in writing by the customer to act as engineer or Inspector for the purpose of the contract. In case where no such engineer has been so appointed, the word “Engineer” shall mean the Discom or his duly authorized representative.

6. “Works” mean and include the work or works to be done by the Agency under the contract.

7. The “Contract” shall mean and include the following:
   a. Notice Inviting Tender
   b. Complete Tender document including its amendments if any.
   c. Bid submitted by bidder.
   d. EMD.
   e. Letter of Intent and its acknowledgement.
   f. Security Deposit/ Performance Guarantees.
   g. Detailed Work order.
   h. Addenda that may hereafter be issued by the Discom to the Agency in the form of letter and covering letters and schedule of prices as agreed between the Agency and the Discom.
   i. The agreements to be entered as per Tender Document.
   j. Requisite Power of Attorney in favor of the authorized signatory of the Bidder.

8. The “Specification” shall mean the specification; specific conditions annexed to the General Conditions, the contract schedule, and the annexure thereto, if any.

9. The Month shall mean, English calendar month i.e. period of 30 days and week shall mean a period of 7 days.

10. The “Site” shall mean the place or places named in the contract and include, where applicable, the lands and buildings upon or in which the works are to be executed.

11. “Acknowledgement of Letter of Intent” shall mean the Bidder’s letter conveying his acceptance of it being successful bidder and its intent to perform the contract.

12. “Acknowledgement of Work Order” shall mean the Bidder’s letter conveying his acceptance of the tender as per the terms and conditions as been stated therein.

13. The “Contract Price shall mean the sum named in or calculated in accordance with the provisions of the contract purchase or any amendments thereto.

14. “Letter of Intent” Letter issued by Discom to the successful bidder informing him that the bidder is successful bidder.

15. “Work Order” shall mean the Discom’ letter which may be issued in the way of letter containing detailed terms and conditions of the work and such other particulars which the Discom may like to convey to the Agency pending signing of a formal written Contract.

16. “Writing” shall include any manuscript type written or printed statement under or over signature or seal as the case may be.

17. The Work “Codes” shall mean the Indian Electricity Act/Electricity Supply act and Indian Electricity Rules and the rules made there under applicable in the State of Uttar Pradesh on the date of Letter of Intent with such special modification thereof as may be specially stipulated by competent State Authorities i.e. Chief Electrical Inspector of Uttar Pradesh.

18. Works importing “PERSON” shall include firms, Companies, Corporations and other bodies whether incorporated or not.

19. Words importing the singular only shall also include the plural and vice version where the context requires.

20. Terms and expressions not herein defined shall have the same meaning as one assigned to them in the Indian Contract Act (Act IX of 1872) and falling that in the General Clause Act, 1897).

3.2 CONTRACT

After the selection of successful bidder Discom will issue Letter of Intent and subsequently a detailed Work Order to such bidder. A contract shall be entered into between Discom and the successful bidder.

3.3 CONTRACT VALUE

Contract Value shall be termed as total order value as quoted / accepted by the Successful Bidder in the Financial Bid.

3.4 CONTARCT PERIOD

Completion Period-:
The completion period shall be 03 months from the date of contract for supply, installation & commissioning (Handing & Taking Over) including end to end functionality. Conversions of any new multistorey added in project should be completed in 03 months after notification.
FMS Period-
Initially facility management services period would be applicable for 3 years after completion period. On the basis of performance, it can be extended. Each extension would be of 2 years with maximum 2 extensions.

3.5 TERMINATION OF CONTRACT/APPOINTMENT

A. Termination for Default

a. The Purchaser may, without prejudice to any other remedy for breach of Contract, by Notice of default sent to the Supplier, terminate the Contract in whole or in part if the Supplier fails to deliver any or all of the Goods or Related Services within the period specified in the Contract, or within any extension thereof granted by the Purchaser

b. If the Supplier, in the judgment of the Purchaser has engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract; or

c. Any representation made by the bidder in the proposal is found to be false or misleading

d. If the Supplier commits any breach of the Contract and fails to remedy or rectify the same within the period of two weeks (or such longer period as the Purchaser in its absolute discretion decide) provided in a notice in this behalf from the Purchaser as specified in the SLA.

e. In the event the Purchaser terminates the Contract in whole or in part, the Purchaser may procure, upon such terms and in such manner as it deems appropriate, Goods or Related Services similar to those undelivered or not performed, and the Supplier shall be liable to the Purchaser for any additional costs for such similar Goods or Related Services. However, the Supplier shall continue performance of the Contract to the extent not terminated.

f. If the implementation schedule of work is delayed for more than 30 days beyond the stipulated time then Discom will have liberty to terminate the contract.

g. If the services of the vendor are not as per the awarded work for three consecutive months after commencement of work then Discom will have liberty to terminate the contract.

B. Termination for Insolvency

The Purchaser may at any time terminate the Contract by giving Notice to the Supplier if the Supplier becomes bankrupt or otherwise insolvent. In such event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect any right of action or remedy that has accrued or will accrue thereafter to the Purchaser.

C. Termination for Convenience

The Purchaser, by Notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The Notice of termination shall specify that termination is for the Purchaser's convenience, the extent to which performance of the Supplier under the Contract is terminated, and the date upon which such termination becomes effective.

3.6 FALL BACK ARRANGEMENT

a. In the event of failure of the Agency to fulfil its obligations, duties and responsibilities as per the terms & conditions of the Contract, Discom shall inter-alia have the right, at any time to resort to fall back arrangement. Under such arrangement, Discom shall take charge of all facilities and systems whether in operation or under execution after giving suitable notice as provided in the Contract and can recover from the BGs & other holding of agency with Discom, the losses suffered due to such failure. If the BGs & other holding of agency is insufficient, the Agency shall pay the difference to Discom failing which Discom shall have right to recover the sum through legal or other means.

b. The Discom shall have the right in such circumstances to manage the system itself after taking charge of the facilities as above or through any other agency as it may deem fit and no claim of Agency for compensation in this respect shall be entered.

c. The Discom shall have the right in such circumstances to blacklist/bar/disqualify the Agency from submission of Bid to the any Discom(s) at least for one year.

3.7 TRANSITION / PROJECT COMPLETION

a. The Contract shall require the Agency to cooperate in handing back thefacilities, records, data backup and documents, in good working order to Discom after termination of Contract.

b. Upon termination of the Contract, the Agency's authority to act in the area shall immediately cease. In order to smoothen the handing over process and not hampering the work, Discom shall arrange to award the Contract to other firm or may execute the work departmentally at-least 6 months before expiry of this Contract, the Agency/Discom staff may require to work along with the new agency for remaining period of Contract to enable the new agency to understand the process.

3.8 PERFORMANCE SECURITY

a. The contractor shall deposit security in modification to Clause '3' of "General Conditions of the Contract 'Form 'B' @10 % (Ten percent) of contract value in the form of Bank Guarantee from a scheduled/nationalized Bank of India duly executed on non-judicial stamp paper of requisite value: (at present Rs. 100/-) in the enclosed proforma. duly pledged in favour of the Executive Engineer to Managing Director, Madhyanchal Vidyut Vitran Nigam Limited, Lucknow.

3.9 AGENCY TO INFORM HIMSELF FULLY

a. The Contract shall be considered to have come into force from the date of its signing. The contractor shall be deemed to have carefully examined the Tender document including General Conditions, specifications and schedules. Also it shall deemed to have satisfied himself with the nature and character of the work to be executed and where necessary, of the site conditions and other relevant matters and details. Any information thus had or otherwise obtained from the Discom or the Engineer shall not in any way relieve the contractor from his responsibility for the supplying of the hardware and other equipment and executing the work in terms of the contract including all details and incidental works and supply all accessories or apparatus which may not have been specifically mentioned in the contract but necessary for ensuring complete erection and safe and efficient working of the equipment.

3.10 CONTRACT DOCUMENTS

a. The order placed under this Tender document shall be governed by the terms and conditions as incorporated in this Tender document and as given in the detailed work order. The terms and conditions as specified in this Tender document if differ from the terms indicated in the detailed work order the later shall prevail.

b. The contract shall for all purposes be construed according to the Laws of India and subject to jurisdiction of Uttar Pradesh Courts only. For the due fulfilment of the contract, the Agency shall execute the Contract in the prescribed form, in prescribed number of copies on Uttar Pradesh State Non-judicial stamp paper bearing stamp duty as applicable. The expenses of completing and stamping the Contract shall be borne by the Contractor. Such Contract shall beexecuted and signed by the authorized signatory of the Agency on each page thereof.

c. Such complete agreement form along with the contract documents together with a “Power of Attorney” in favor of the Executants shall be required to be returned to the Discom within a period of 15 days from the receipt of order duly signed on each page. One copy of the executed agreement duly signed by the Discom shall be sent to the supplier for his reference.

d. The contract documents shall mean and include the following: -

(i) Contract agreement
(ii) Notice Inviting Tender
(iii) Complete Tender document including its amendments if any.
(iv) Bid submitted by bidder
(v) EMD.
(vi) Letter of Intent and its acknowledgement.
(vii) Security Deposit/ Performance Guarantees.
(viii) Detailed Work order& its annexure.
(ix) Addenda that may hereafter be issued by the Discom to the Agency in the form of letter and covering letters and schedule of prices as agreed between the Agency and the Discom.
(x) The agreements to be entered as per Tender Document.
(xi) Requisite Power of Attorney in favor of the authorized signatory of the Bidder.

3.11 CHANGE OF QUANTITY/AREA

a. **Change of Area**: This tender is meant for entire MADHYANCHAL Discom, list of existing multistory buildings where conversion from single point to multipoint metering is to be done is given in Scope of Work, and however new requirements may take place as per requirement of MVVNL. The Vender has to provide his services in all areas as per MVVNL requirement.

b. **Change of Quantity** - The quantities set out are only tentative and estimated quantities of work. They are not to be taken as the actual and correct quantities of the work to be executed by the contract or in fulfilment of his obligations under the contract. It is clarified that the quantity variation of particular item of final BOQ based on joint survey with NIGAM officers during commencement period submitted with inception report shall be allowed on the awarded unit rates of particular item after adjudging the field requirement and due approval of the competent authority.

As it's a running project and more multistorey can opt for conversion If required the owner reserves the right to increase or decrease the quantities of items as specified in the accompanying technical specifications as may be necessary, at the time of award of contract or during the execution of the contract. Any item can be deleted in total, if not required during execution.

Note-:

1) It is also to mention that if quantity exceeds by more than 50%, 30% of reduction of unit rates per 50% increase would be applicable.

2) During extension period price escalation would be applicable.

3) Bidders are expected to quote percentage of escalation on each extension.

3.12 GIFTS AND COMMISSIONS ETC.

Any gift, commission, or advantage given, promised or offered by or on behalf of the contractor or his partner, agent, officers, director, employee or servant or any one on his or their behalf in relation to the obtaining or to the execution of this or any other contract with the Discom, shall be, in addition to any criminal liability which it may incur, subject of any loss or damage to the Discom resulting from any cancellation. The Discom shall then be entitled to deduct the amount so payable from any moneys otherwise due to the Agency under the contract.

3.13 COMPLIANCE OF LABOUR LEGISLATION:

The Agency shall discharge its liability of employer in respect of personnel to be engaged for delivering service under this Contract, as laid out in EPF, ESI and minimum wages act applicabale in Uttar Pradesh and GOI.

3.14 INSURANCE

The agency at his own cost shall arrange, secure and maintain all insurance (Equipment &manpower) as pertinent to the works and obligatory in terms of law to protect its interest and interest of Discom against all perils. The validity of insurance shall be valid till expiry of contract

3.15 LIABILITY FOR ACCIDENTS AND DAMAGES

a. The Agency shall be liable for and shall indemnify the Discom in respect of all injury to person or damage to property resulting from the negligence of the Agency or his workman or from defective work but not from any other cause.

b. Provided that the Agency shall not be liable for any loss or profit or loss of Contract or any other claim made against the Discom not already provided for in the contract, not for any injury or damage caused by or arising from the acts of the DISCOM or of any other person or due to circumstances over which the agency has no control, not shall his total liability for loss, damage or injury under this clause exceed the total value of the Contract.

c. The Agency will indemnify and save harmless the Discom against all actions, suits, claims, demands, costs, or expenses arising in connection with injuries (other than such as may be attributable to the Discom or his employees) suffered prior to the date when the work shall have been taken over hereof by persons employed by the agency on the work, whether at common law or under the workman's compensation Act-1923 or any other statute in force at the date of contract relating to the question of the liability of employees for injuries suffered by employees and will if called upon to do so take out the necessary policy or policies of insurances to over such indemnity.

d. The Agency shall insure against such liabilities with an insurer approved by the Discom and shall continue such insurance, during the whole of the time that any person(s) are employed by him on the works and shall when required produce to the Discom, such policy of insurance and the receipt for payment of the current premium.

3.16 PROJECT OFFICE AND PERSONNEL

a. Project Office :

The Agency should have a project office in Lucknow for project management & other related communications.

b. Personnel:

(i) The Agency shall deploy exclusive supervisory and other personnel for efficient management of the work under contract. However this contract is on service model, Agency shall be responsible for smooth & timely execution of work by appointing sufficient number of manpower.

(ii) Agency shall immediately inform the Discom about any change of personnel/contact numbers through Email and post.

(iii) Agency shall issue identification cards (ID card) to all its personnel engaged in the work under the contract. The identification card duly signed by authorized signatory of managerial position of the agency.

3.17 AGENCY's RIGHTS

a. The Agency will be given rights to operate in the area during the Contract period for carrying out the work, which shall cease to exist on completion of the said period or on termination of the Contract.

3.18 CONTRACT AGREEMENT

a. The Contract shall set out specific events of default by one party that will entitle the other party to terminate the Contract. The party committing an event of default, which is capable of being remedied, will be given a reasonable opportunity to remedy the default.

b. The Contract can however be otherwise terminated by either party by giving six-month notice and on terms to be mutually agreed which may include payment of suitable compensation for losses suffered by the other party due to such termination.

c. Agency shall indemnify Discom against any claims, demands, costs and expenses whatsoever which may be made against it, because of failure of the Agency or its representatives in the performance of their duties and negligence, any accident or injury to any person.

3.19 Proof of concept

If required by Nodal Officer or MD, MVVNL, the Agency shall arrange proof of concept with one bulding for Dual Source metering before final roll out. A designated team of MVVNL comprising members of IT/Test and Division officers will witness and approve the proof of concept as per specification. You have to arrange demonstration / Testing of system ascertaining compliances of various features of system or the entire solutions provided by you before deployment and incorporate requirements of Discom pertaining to work.

Acceptance Testing Criteria (primarily for MVVNL related Utility power Data)

The acceptance testing criteria mentioned herein shall be applicable for declaring successful commissioning of AMI system.

SN	Function	Test Procedure	Desired Result
1	**Mode of Interface - Optical or RS232/485**	The device to be installed at the meter should interface with the meter through Optical Probe or RS232/485 port available at meters.	

SN	Function	Test Procedure	Desired Result
2	**NAN (Local/Neighbourhood Access Network)**	The NAN network has to be setup on RF-865 MHz mesh network i.e. all consumer meters within a complex need to communicate with the DCU on RF-865 MHz mesh network. There should be no loss of data. The availability of the data will be verified at the backend. Minimum 99% of the data should be available over a period of 15 days.	No Loss of data. The availability of meter data will be verified at the back-end, the minimum criteria is 99% over a period of 15 days i.e. if the read interval is 5 minutes then a total 4320 readings should be taken in 15 days and to achieve the success criteria a minimum of 4276 reading per meter should be available at the backend.
3	**Web Based Interface**	All the testing, setting of parameters, viewing of report & notifications, configuration, collection of meter data should be available through Web Interface. The Web Application should have different access level i.e., facility to create users with different access rights. Multiple login (Minimum 10 users) should be available.	Successful execution of the AT through Web Application.
4	**Automatic Meter Reading of consumer meter and single point meter**	The meter reading of all the meters will be physically verified with the readings available at the head end system. This testing will be done in the field through the Web Application. The meter reading interval should be programmable in multiple of 5 minutes with minimum interval as 5 minutes.	99% readings with timestamp should be available at the backend
5	**Outage Detection and switching of meter register for Utility power and DG**	The Utility supply at single point meter will be disconnected and it will be verified that the system provides the information at the backend with proper time stamp. DG will be started. Consumer meters to record energy consumption during DG run period in DG register. Online dashboard to provide DG running status. The system should provide the information with time stamp. The Utility Supply will be restored, and the system should provide the information with time stamp. While supply is on Utility power, DG will be started. No consumer/ common area meter should record consumption in DG mode. While supply is on Utility power, DCU shall be switched off. After 15 minutes, DCU is switched on. Consumption data should come at the back-end as recorded in the meter. The time of disconnection and restoration will be verified in real time i.e. through the Web Application and through the outage report generated by the system. The switch between Utility power and DG should happen accurately and reliably with consumption recording in respective registers and displayed through the web interface of utility and / or RWA Revenue Management System.	99 % accuracy in outage reporting i.e. out of 200 such events minimum 198 should be accurately reported. The Web application should provide information of outage in near real time (maximum permissible delay is 120 seconds)

SN	Function	Test Procedure	Desired Result
6	**Power Quality Parameters - Monitoring of Voltage, Power Factor, frequency and current**	MVVNL will set the threshold limit for High and Low Voltage alerts, Low Power factor alerts, High & Low Frequency alerts and High Current. The system should generate alerts in real time if any of these limits are breached. The limit setting will be done from the backend i.e. through Web Application. The provision to disable alert for any of the parameters should also be available.	99% of the alerts should be recorded. The threshold limits of different parameters should be changed through the Web Application, as below: - Voltage High and Low - PF low - Frequency High and Low - Current High Alerts should be deactivated through Web Application
7	**Load Management - Restricting the consumer load to contracted limit**	MVVNL will set the load limit of consumer if the load being consumed exceed the contracted load the system should disconnect the supply of the consumer. Different Load will be set for different consumer. Also, the system should work in alert only mode i.e. the provision to disconnect will be disabled but if consumer exceeds load, appropriate alert should be issued. The load setting can be done either in kW or in kVA	Disconnection of consumer on exceeding load and issue of proper alert message. Change of contracted load of consumer from backend. No disconnection, alert only mode
8	**Remote Disconnection**	MVVNL through Web Application, will disconnect the supply of consumer	The consumer supply should be disconnected, and the supply should not be available to consumer.
9	**Prepaid Functionality – Automatic Disconnection and Reconnection**	The consumer supply should get disconnected if his account balance is exhausted, taking into consideration any grace amount if applicable. The system should disconnect the consumer if the recharge amount is consumed and the supply should be restored on recharging the consumer. This will be done through web application. There should be a functionality to reconnect the consumer without recharge also.	Successful disconnection and reconnection of prepaid feature through web application. This should work equally well for Utility power and DG supply.
10	**Energy Audit Data in kWH**	This functioning is achieved by collecting the kWH reading of all the meters, in a complex, within a span of 4 to 5 minutes i.e. if energy audit is required for 12:00 HRS then all the meters should be read from 12:00 HRS to 12:05 HRS. The energy audit interval will be programmed from the backend. The minimum audit interval should be 6 hours i.e. 4 energy audit data point per day. The energy audit start time should also be programmable. The Audit reports will be physically verified for its accuracy.	The meter reading for all the meters, for audit function, should be within a span of not more than 5 minutes to maintain the accuracy of the audit. All the data should be available with time stamp.
11	**CAP power deduction mechanism**	The electricity consumption (energy charges) and demand charges (fixed charges) of common area supply to be deducted on daily basis through prepaid account balance of individual consumer apportioned according to contracted load of the consumer.	The Energy difference of the reference meter & cumulative consumption of meters of individual consumers shall be apportioned according to the

SN	Function	Test Procedure	Desired Result
			contracted load of the individual consumers having electricity connection in the M.S. building. Software should have the feature to implement this mechanism.
12	**Change of Meter**	Two to three meters (already integrated on the system) will be changed and the change will be updated on the system through web application. On committing the changes, the system should start collecting the data from these meters. No hardware change is allowed.	Successful integration from backend without changing the hardware at the customer premises or visiting the customer premises.
13	**Alert / Event Notification**	The AT Officer will test for the following alerts - Device Tamper i.e. opening the meter box - Device not communicating on Optical probe removal (in case of (OTT)	99% of the alerts should be recorded.
14	**Network Monitoring Centre**	All the devices should be centrally monitored from a NOC and the deviations should be updated on NOC in real time	Availability of NOC monitoring system
15	**Localized Intelligence - Functioning of critical functions even in absence of backend connectivity**	The connectivity of Gateway / Data Aggregator at the DT will be disconnected from the backend system. The following functionalities will be tested: - - Disconnection of consumer on High / Low Voltage and power factor - The customer should be disconnect on exceeding the contracted load	99% accuracy
16	**On demand reading**	Though the system is fully automated, but provision to pull the meter data should be available. MVVNL AT Team will test by issuing on demand commands from the web application.	99% success rate of on demand reading
17	**Firmware Over the Air (FOTA)**	The solution should support firmware upgrade over the Air. The solution provider will be required to demonstrate. For example, a different make meter shall be placed by removing existing meter. From Back-end through FOTA, the meter should be read without change of OTT hardware.	Same OTT should work with the new meter and the data should get successfully read.
18	**Consumer Application**	The AIA will provide a consumer application smart phone through which the consumer, on keying in his/her login credentials, is able to view all the meter parameters as reading, voltage, current, power factor, load with time stamp. The user interface should also be available on Web.	The users should be able to monitor their meter data
19	**Integration with existing billing**	The data should be in real time available either through online API or in downloadable file format that can be directly exported to billing system.	On demand availability of billing data without requiring any mediation layer for all types of meters. The data for different types of meters should be available in common format

SN	Function	Test Procedure	Desired Result
			required by the billing system.
20	**Integration with existing systems**	The solution should provide XML / SOAP/REST based interfaces to integrate with existing or future system of MVVNL	Successful demonstration of functionality.

3.20 SPECIAL CONDITIONS OF CARRYING OUT THE WORK

1. Dual metering system for GRID and DG must be fool proof. Robustness of this shall avoid any confusion with RWA and DISCOM in future as discrepancy in this data may lead to litigation.
2. In Meters UPPCL supply register should be in default mode for registration of power supplied to customers. Generator mode should be triggered when generator supply is being fed into electrical distribution network.
3. The meters are to be as per BIS approved standards with additional features needed for Dual metering as per relevant IS are mandatory.
4. The meters used should have in-built disconnection facility as well communication network.
5. There must be arrangements of prepaid recharge coupon facility as per tariff / Hon'ble UPERC guidelines for GRID supply. DG data shall be provided with secure FTP location with access rights to concerning RWA/Developer/Builder for further process.
6. GRID recharge coupon needs to be integrated with LICENCEE revenue management system. All integration has to happen with automated processes.
7. DG tariff is to be decided by RWA, hence DG revenue management system to reside outside of LICENCEE data center/server. LICENCEE to provide only DG consumption data to outside server.
8. DG revenue management, collection on post-paid / prepaid shall be choice of RWA/ Builders. Any amount pertaining to DG meter data shall accrue to RWA account. LICENCEE shall not have any intervention in this system.
9. Energy accounting shall be done by LICENCEE for GRID supply only. Energy accounting for DG shall be done by respective RWAs.
10. Single point bulk meter data and data of all consumer meters shall be used for energy audit in an automated manner to detect any pilferage of electricity at building level after agreement with RWA.
11. While as per meter data received service provider shall process Grid readings as per UPPCL/ Hon'ble UPERC established practices like billing, disconnection, and load control, etc., and for DG data, RWA shall be free to implement their own mechanism.
12. For transparency and to avoid any issues related to Grid / generator power consumption issues and charges being deducted for common area power, a real time mobile based application as prevalent in these buildings should be adopted.
13. Mass disconnection facility should be provisioned, in case of non-payment or to tackle other unforeseen issues.
14. Service Provider will deploy, Manage, Maintain, AMR Network at building level do energy audit on daily basis. The server used for this purpose shall be exclusive and shall be integrated with MVVNL billing server.
15. Service Provider need to provide centralized monitoring system capable of generating alerts, reports etc. as desired by MVVNL including deployment of server as well as can maintain uptime or server as per Utility defined SLA.
16. Empaneled service provider to be capable of integrating/providing data of MVVNL supply to MVVNL billing system in desired formats and should integrate with MVVNL Billing system. The server will be used only for billing purposes of MVVNL.
17. Empaneled service provider needs to execute tripartite agreement with MVVNL and builder/developer/RWA before starting the work.

18. Empaneled service provider needs to supply, install and commission all the equipment, i.e. servers, switches/routers and other necessary equipment.
19. Empaneled service provider shall under take the operation and maintenance of complete AMI (Advance Metering Infrastructure) System for contract period. The operation and maintenance charges will include replacement of defective equipment/material supplied by the service provider, carrying out regular and periodic field activities required for ensuring proper health of the deployed infrastructure etc.
20. The Service provider shall also provide adequate manpower 24×7 to maintain the system for contract period from the date of successful installation and commissioning of the multi point system.
21. Common area electrical charges to be calculated on the basis of given guidelines/logic on daily basis.
22. The quantity mentioned in the price bid is tentative which can vary as the actual requirement of site.
23. The empanelment for the above work shall be reviewed every year based on the performance of Facility Management Service provider. MVVNL reserves the right to empanel other Facility Management Service provider as per the requirement & the prevailing conditions.
24. The energy meters shall only be purchased from the approved vendors to be selected by MVVNL.

3.22 Performance Levels

(a) These performance levels shall apply to the completeMulti-Point AMI system.

(b) AMI system includes the communications links provided by Network Provider /third parties such as telecommunications companies and AMI Implementing Agency (AIA) has to ensure the desired performance level.

(c)The performance levels are average performance levels over the period of a year and exclude force majeure events.
The following are the required performance levels (**Performance levels for collection of daily meters Readings):**
(1) All interval data from 95% of meters within 8 hours after midnight; and
(2) All interval data from 99.9% of meters within 24 hours after midnight.
(3) In the event if data of a meter is not received beyond 24 hours, on occurrence of such event beyond 4 times in a month. FMS charges of respective meter shall not be paid to Service Provider.
Performance levels for remote reads of individual meters if data is not received on daily basis. The performance level of an individual read applies to the collection of seven days of interval energy data and the current total accumulated energy from a particular AMI meter whose data is not being received on daily basis.
The performance level required shall be:
(1) Action performed at 90% of meters within 1 Hour;
(2) Action performed at 99% of meters within 2 hours; and \
(3) Action performed at 99.9% of meters within 6 hours.
Performance level for remote load control commands for selected consumers,
The performance level required for individual meters shall be:
(1) Action performed at 95% of meters within 3minutes;
(2) Action performed at 99% of meters within 5Minutes
Performance level for remote connect/disconnect for selected consumers,
The performance level required for selected individual meters shall be:
(1) Action performed at 90% of meters within 2minutes;
(2) Action performed at 99% of meters within 3 minutes; and
(3) Action performed 99.9% of meters within 5 minutes.
Performance levels for meter's failure to register energy as per energy source Alarms to be received within 1 minutes.
Performance levels for updating of data on consumer portal/ app
The performance level of updating of individual consumer data on portal/ app after receiving the data in MDM shall be:
(1) Action performed for 90% of consumers within 15 minutes after receiving the data in MDM;
(2) Action performed at 99.5% of meters within 30 minutes after receiving the data in MDM.
Performance levels for resolution of disconnection related issues

(1) Software related issues to be resolved within 1 hour
(2) Other issues to be resolved within 8 hours. In case of default to above FMS Charges of respective meter will not be paid.

Performance levels for replacement of defective meters

(1) Meter should be replaced within 2 days. In case of default monthly FMS charges of that meter will be deducted. The performance level for generation of bills would be as per requirement of the utility. The performance levels regarding meter discovery time line after installation, on demand reading of meter data for operational purposes, outage restoration enquiry response time etc. would also be as per requirement of the utility.

3.21 MODE & TERMS OF PAYMENT

To ensure the timely completion of work in totality & also to ensure the adequate cash flow for the firm, the following payment terms may be considered: -

Payment of Meter Supply, installation & commissioning:

Delivery, Installation and Commissioning-

Payment of Supply: - 80% payment of installed quantity after successful go-live. Remainig 20% payment of the installed quantity after six months of go-live of the project.

Facility Management Service: - Monthly payment against raised invoices of FMS Service shall be evaluated against the uptime and frequency of data provided at set interval as per SLA conditions/ performance level of the tender.

a. Building wise Invoice raised against supply and installation of Material should be verified by concerned EE(Distribution) of concerned division.
b. For FMS service invoices should be raised to SE(IT), MVVNL.
c. Payment shall commence by SE(IT), MVVNL, Lucknow after receiving of verified bills.
d. Payment will be done by DDO MVVNL, Lucknow.

• The Superintending Enginner (IT), MVVNL, Lucknow upon receipt of the verified invoice and accompanying documentation, shall send it to accounts for processing of payment.

• Following documents shall be submitted along with the invoice

a. A certificate/undertaking to the effect that proof of GST charges at actual as has been claimed and other relevant documents for reimbursement of charges paid by the supplier on behalf of the purchaser, have been enclosed with the original invoice.

b. Acceptance letter of contract agreement, BGs (one time).

c. Other documents/proof of service rendered during the month.

3.21 PENALTIES

Penalty shall be calculated as below-

1. If the implementation is delayed beyond awarded time, the payment to bidder will be liable for deduction as penalty @ 1 % of respective implementation cost per week, or part thereof.
2. A penalty @0.5 % of contract price per week shall be levied for delay in execution of the work as per implementation schedule. Penalty will be maximum 10% of contract price.
3. Beyond the minimum performance level for each 1% there shall be penalty of 5.0% of monthly FMS charges of respective meters.

3.22 IMPLEMENTATION AND ROLLOUT SCHEDULE

a) The Agency has to submit the plan for customization and rollout of the scope of the work as per the terms and conditions of the award.

b) Penalty will be levied for delay in execution and rollout as per the Penalties given in this Tender document.

c) Timeline for various modules will be as follows

S. No.	Particular of activity	Time schedule Desired	Time Schedule as per Bidder
1	Furnishing detailed Road Map	Within 10 days from the date of Awarding Contract	
2	Submission of detailed inception and survey report	Within 10 days from the date of Work Order	
3	Approval of survey report and revised quantity	Within 10 days from the date of submission of survey report	
4	Commencement of supply of Material which shall be atleast 20% of orederd quantity	Within 15 days from the approval of survey report	

d) The Implementation Agency shall have alternate arrangements to continue to execute the work in case of breakdown of their own system.

3.23 Governing Laws and Jurisdiction

The Indian Law shall govern the agreement. Only appropriate courts in Lucknow shall have exclusive Court Jurisdiction to deal with any matter arising out of or relating to the agreement or otherwise.

3.24 JURISDICTION FOR LEGAL PROCEEDINGS

The contract shall be governed by the laws of India for the time being in force and be subject to the court of competent jurisdiction at respective Discom HQ. All disputes, differences questions whatsoever arising between the Discom and the agency upon or in relation to or in connection with the Contracts shall be deemed to have arisen at Discom Head Quarter only and no court other than court at Lucknow, Uttar Pradesh shall have jurisdiction to entertain or try the same.

3.25 Conduct of Agency's Staff

If any of the Agency's employees shall, in the opinion of Discom, is guilty of any misconduct or incompetence or negligence, then if so directed by Discom, the Agency shall at once remove such employee and replace him by an equally qualified and competent substitute.

3.26 Completeness of Contract

The contract shall be considered completed on termination of the contract period after full handing over of data, documents or material and clearing all dues towards the agency.

3.27 Inspection and Testing

All the materials which will be supplied shall undergo pre dispatch inspection by MVVNL officers. Before supply of items, clearance from MVVNL is required. The agency will have offered the materials in writing for material inspection.

Meters to be supplied should be type tested from CPRI/ERDA/ERTL in last 5 years. Type test report at the time of GTP/Drawing approval has to be submitted by the bidder.

Unless the inspection is specifically waived no material shall be dispatched without inspection and clearance for dispatch by the purchase's representative.

The purchaser reserves the right to reject all or any part of the material being manufactured of awaiting dispatch, due to any defect or deviations from the standard specifications prescribed as observed during the

Inspection. In case of any dispute/difference in this regard the decision of the SE (IT) shall be final and binding.

The purchaser also reserves the right to get the material/equipment tested in any recognized Government Laboratory & claiming any compensation or rejecting the material/equipment, if not found in accordance with the specification. All charges consequent to such rejection and replacement/rectification shall be borne by the supplier.

3.28 Guarantee and Replacement of Defective/Damaged Materials

GUARANTEE:

Warranty period for hardware shall be 3 years from the date of completion. After 3 years, warranty would be covered under FMS.

REPLACEMENT OF DEFECTIVE/DAMAGED MATERIALS

Notwithstanding anything contained in the above liquidated damages clause when the whole or part of the materials are found to be defective/damaged or are not in conformity with the specification or sample, such defects or damages in the materials supplied shall be rectified within 48 working hours from the time of intimation of defect/damage either at the point of destination or at the supplier's works, at the cost of supplier, against proper security and acknowledgement. In the alternative, the defective or damaged materials shall be replaced free of cost within 120 working hours from the date of receipt of the intimation from the purchaser of such defects or damages. If the defects or damages are not rectified or replaced within this period, the supplier shall pay a sum towards liquidated damages as per liquidated damages clause given above, for the delay in rectification/replacement of the defects or damages

3.29 Rules and Regulations

The job shall be carried out as per the rules, regulations as prevailing in Discom, which shall be made available to the Agency. These rules and regulations may be modified by Discom from time to time and would be intimated to the Agency for incorporating during the currency of Contract.

The Agency will also follow the labour regulations and the directions of Government and other authorities enforcing the regulations and comply with any other relevant legislation in force from time to time.

3.30 Failure to Execute the Contract

Agency failing to execute the order placed on them to the satisfaction of Discom under terms and conditions set forth therein, will be liable to make good the loss sustained by the Discom, consequent to the placing of fresh orders elsewhere at higher rate, i.e. the difference between the price accepted in the contract already entered into and the price at which fresh orders have been placed. This is without prejudice to the imposition of Penalty/ Liquidated Damages and forfeiture of Performance Security.

3.31 Effecting Recoveries

Any loss, arising due to non-fulfilment of this contract or any other contract, will be recovered from the Performance Security held and or any other amount due to the Agency from the Discom from this Contract as well as from other contracts.

SECTION - VI Installations Terms & Conditions

6.0 SCOPE

The scope of installation work should include the following:

Survey should be carried out to find out the actual / estimated requirement of meters in all project locations in MVVNL.

6.1 INSTALLATION TERMS & CONDITIONS:

Complete List with details of all buildings with in the territory of MVVNL, where survey / installation work is to be carried out shall be furnished to successful contractor along with order.

Supervisor with adequate academic qualification and experience shall be made available by contractor for a group of teams for on-site technical assistance and conflict resolution.

Contractor should submit a work completion report considering the details of material consumed in line with conversion of single point to multipoint.

Installation shall be carried out on pre define installation procedures.

6.2 PROJECT LOCATION

SL. No.	Building's Name	No. of 3-Phase Connection
1	Parth Infrabuild Private Ltd.	736
2	Parshvanath Developers Pvt. Ltd.	542
3	Omex Heights	445
4	Spring Developers	627
TOTAL		2350

SECTION- VII Technical Specification

7.1 Technical Specifications For CT Operated A.C. Three Phase Four Wire L.T, Trivector Smart Energy Meter of Accuracy Class 0.5S and For CT-PT Operated A.C. Three Phase Four Wire Smart Energy Meter of Accuracy Class 0.5S With Bi Directional Communication Facility Suitable For Advanced Metering Infrastructure (AMI).

1. Scope:

The specification covers the design, manufacturing, testing, supply and delivery of AC CT operated 3 phase 4 wires Smart Energy Meter with bidirectional communication facility. The meter shall be suitable for Advanced Metering Infrastructure (AMI). Meter shall have provision for pluggable and interchangeable NIC (RF Mesh/ NBIoT/5G-4G-2G) i.e as per field based requirement NIC of either type can be used without changing the meter. The meter shall communicate to DCU based on RF mesh network and DCU with HES on WAN through NBIoT communication technology with fallback arrangement to available communication technology in sequence of 5G-4G-2G mentioned in IS16444 and Functional Requirements of AMI in India and as per the requirement of the utility.

2.0 Standard:

The meters with accuracy class–0.5S are required measurement of Active Energy and shall conform to the latest edition of following standards Unless otherwise specified elsewhere in this specification, the performance and testing of the meters shall conform to the following standards latest amendments thereof:—

IEC 62052-11	:	Electricity metering equipment (AC) – General requirements, tests and test conditions, Metering equipment
IEC 62053-22:	:	Static meters for active energy, (classes 0.2 S and 0.5 S)
CBIP 304: read with latest revision thereof	:	Standardization of AC Static Electrical Energy Meters, publication no. 304
IS:14697:1999 read with latest revision thereof	:	Indian Standard, AC Static Transformer Operated Watthour and Varhour meters, classes 0.2 S, 0.5 S and 1.0S-Specification.
IS 15959 (Part 1):2011 read with latest revision thereof	:	Data exchange for electricity meter reading, tariff and load control - Indian Companion Standard
IS 15959(Part 2):2016 read with latest revision thereof	:	Smart Meter
IS 15959(Part 3):2017 read with latest revision thereof	:	Smart Meter(Transformer Operated kWh and kVARh, Class 0.2 S, 0.5 S and 1.0 S)
IS 16444 Part -2with latest amendments	:	A.C. Static Transformer Operated Watt Hour and Var-Hour Smart Meter Class 0.2S, 0.5S and 1.0 S All related

		relevant specified IS shall also applicable
CEA Guidelines regarding Smart Metering	:	Functional Requirements of Advance Metering Infrastructure AMI in India
	:	Guidelines For Comminication System Of Smart Meters Plc ,Rf,Cellular Network (3g/4g)

Meters meeting other authoritative standards which ensure an equal or better quality than the standard mentioned above, will also be acceptable. All kinds of tests which are required as per (IEC-687)/CBIP report No. 88 (revised June, 2000) and 3rd amendment/errata February, 2002 and latest amendment thereof shall be carried out.

3.0 Basic Features:

The Smart Meter would have the following minimum basic features/services-

- Measurement of electrical energy parameters,
- Bidirectional Communication,
- Tamper event detection, recording and reporting,
- Power event alarms such as loss of supply, low/ high voltage,
- Remote firmware upgrade from HES,
- Net metering features,
- On demand reading from HES,
- Scheduled Meter Reading From HES,
- All programming requests from HES,
- Smart meter association requirement,
- Push services,
- Advanced security profile,
- Communication profile,
- Parameter list for smart meters,

4.0 Communication:

The meter shall communicate to DCU based on RF mesh network and DCU with HES on WAN through NBIoT communication technology with fallback arrangement to available communication technology in sequence of 5G-4G-2G mentioned in IS16444 and Functional Requirements of AMI in India and as per the requirement of the utility.. Meter shall have provision for pluggable and interchangeable NIC (RF Mesh/ NBIoT/5G-4G-2G) i.e as per field based requirement NIC of either type can be used without changing the meter.The plug-in module shall be field swappable with suitable integrated communication module as agreed between buyer and the seller. This module should be able to connect NAN or WAN (as per the plugged module RF Mesh/ NBIoT/5G-4G-2G) for two-way communication. The meter shall log communication module removal /non responsive event with snapshot.

5.0 Climatic Conditions:

The requirements given in **8** and **12.6** of IS 14697 shall apply.The meter shall be required tooperate satisfactorily and continuously with specified accuracy under hot, dusty and tropical conditions and other climatic condition specified as hereinafter:—

i)	Specified operating range	:	–10°C to + 55°C
ii)	Limit range of operation	:	–20°C to + 60°C
iii)	Limit range of storage and Transport	:	–25°C to + 70°C
iv)	**Relative Humidity:**		
	(a) Annual Mean	:	<75%
	(b) For 30 days (spread over one year)	:	<95%
	(c) Occasionally on other days	:	<85%
v)	Maximum attitude above M.S.I.	:	1000 Meter
vi)	Average Annual rain fall	:	1200 mm.

6.0 Current And Voltage Rating:

- The Rated Basic and maximum current for CT Operated A.C. Three Phase Four Wire L.T, Trivector Smart Energy Meter shall be as given below :—

Sl. No.	Voltage	Basic current	Maximum current (A)	Rated Voltage (Phase to Neutral)
1	**2**	**3**	**4**	**5**
1.	**415 V (phase to phase) & 240 V (phase to neutral)**	**5 Amp**	**200% times Ib**	**415 V (phase to phase) & 240 V (phase to neutral)**

Above data indicate that max. current is 200% of Ib at which the meter purports to meet the accuracy requirement.

- The Rated Basic and maximum current of 11KV and 33 KV Static Trivector Meters shall be as given below :—

Sl. No.	Voltage	Basic current	Maximum current (A)	Rated Voltage (Phase to Neutral)
1	**2**	**3**	**4**	**5**
1.	11KV	05 Amp.	2 Times Ib	63.5 Volt

2.	33KV	01 Amp.	2 Times Ib	63.5 Volt

Above data indicate that max. current is 200% of Ib at which the meter purports to meet the accuracy requirement.

6.0 Metering:

6.1 **Metering Requirement:**

Metering and metrology requirement shall be according to IS 14697.

6.1.1 **Classification:**

The classification as per **4** of IS 14697 shall apply.

6.1.2 **Ratings:**

6.1.2.1 **Standard reference voltage:**As per **5.1** of IS 14697 and shall be as following:

Meters for	**Standard Exceptional Reference Voltage Values (V)**	**Exceptional Values (V)**
Connection through voltage transformer	240(415)	250(433)

6.1.2.2 **Standard Basic Currents:** As per **5.2** of IS 14697 the basic currents shall be 5 A AC CT operated 3 phase 4 wires Smart Energy Meter and as per **5.2** of IS 14697 the basic currents shall be 5 A and 1 A for 11KV and 33 KV Smart Static Trivector Meters respectively.

6.1.2.3 **Maximum current:** As per **5.3** of IS 14697 the rated maximum currents shall be 2 times of basic current

6.1.2.4 **Standard reference frequency:** As per **5.4** of IS 14697 Standard value for reference frequency is 50 Hz.

6.2 **General Constructional Requirements:** The requirements given in **6.1** to **6.4** of IS 14697 shall apply. The communication modules shall be plug in type as mentioned in **1.4 of IS 16444 part-II**. The plug-in communication modules shall be properly secured on the smart meter, both physically and electrically, so as to avoid any possible tampering with adequate provision for sealing.For Terminals-Terminal Block(s) —Protective Earth Terminal the requirements given in **6.4** of IS 14697 shall apply.For Terminal Cover the requirements given in **6.5, 6.5.1, 6.5.2** and **6.7** of IS 14697 shall apply.

7.2.1 Meter shall be designed and constructed in such a way as to avoid introducing any danger in use and under normal conditions so as to ensure specially the following:—

1. Personnel safety against electric shock
2. Personnel safety against effects of excessive temperature.
3. Protection against penetration of solid objects, dust and water.
4. Protection against spread of fire.
5. Detection against fraud or pilferage.

There should not be any screws in the meter body through which meter can be opened and tampered without breaking the seal.

7.2.2 All the material used in the manufacture of meters shall be of highest quality. The entire design and construction shall be capable of withstanding stresses likely to occur in actual service and rough handling during transportation.

7.2.3 All insulating material used in the construction of meter shall be non-hygroscopic non ageing and of tested quality and will conform to tests as specified in relevant Standards. The meter shall be designed on application specific integrated circuit and shall be manufactured using SMT (Surface Mount Technology) components.

7.2.4 The terminal block, the terminal cover and the meter case shall ensure reasonable safety against the spread of fire. They should not be ignited by thermic overload of live parts in contact with them.

7.2.5 The meter shall have seamless ultrasonically welded insulated body, along with unidirectional screws and wall mounted projected type to be fitted with the help of screws.

7.2.6 The meter shall conform to the degree of protection IP51 of IS:12063/IEC:529 for protection against ingress of dust, moisture and vermin.

7.2.7 All parts which are subject to corrosion under normal working conditions shall be protected effectively. Any protective coating shall neither be liable to change by ordinary handling nor damaged due to exposure to air under normal working conditions.

7.2.8 The meters shall be designed such that their working remain unaffected by electromagnetic interference, electrostatic discharges and high voltage transients as specified in CBIP Report No. 304 and latest amendment thereof.

7.2.9 **Meter Case:**

The meter shall have completely ultrasonically seamless type welded (in such a manner that it cannot be opened without breakage or crack) insulated body and be of wall mounted panel mounted projected type fitted with the help of screws. The meter case shall be made of unbreakable high grade fire resistant, high grade engineering plastic which is sealed in such a way that the internal parts of the meter are accessible only after breaking the meter cover seals. The meter cover shall be fixed permanently and shall not be removable without the use of a tool. The meter cover shall have two sealing unidirectional screws, each screw having a sealing hole. These screws shall be made of tin plated brass and capable of being tightened from front. The meter case shall have three mounting holes. Two holes for mounting screws on the terminal

block sealed beneath the terminal cover and one for hanging screws on the top. The meter body shall have seamless ultrasonically welded insulated body in such a way so that meter body cannot be opened without breaking the body of meter.

7.2.10 **WINDOW:**

The meter cover shall be of high grade, fire resistant, high grade engineering plastic with one window made of UV stabilized, poly-carbonate plastic for reading the register and observation of operation indicator. The window shall be of a transparent material ultrasonically welded with the meter cover such that it cannot be removed undamaged without breaking the meter cover seals.

7.2.11 **Terminals And Terminals Block:**

The base of the meter shall have a terminal block at the bottom made out of high grade engineering plastic so as to facilitate bottom connection and houses solid nickel plated brass terminals having capability to carry maximum value of current.

The material of the terminal block shall be capable of passing the tests given in IS 14697: 1999/ CBIP - 304 and latest amendment thereof.

The terminal holes in the insulating material shall be of sufficient size to accommodate the insulation of the conductors. The diameter of the terminal hole for current terminals shall not be less than 5.0 mm & shall be of adequate length in order to have proper grip of conductors / crimping pins with the help of two screws.

The terminal block shall satisfy all the conditions such as clearance & creepage distance between terminals & surrounding part of the meter as specified in relevant clause of IS 14697: 1999/ CBIP-304 and latest amendment thereof.

The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there shall have no risk of loosening or undue heating. Screw connections transmitting contact force and screw fixing which may be loosened and tightened several times during the life of the meter shall be such that the risk of corrosion resulting from contact with any other metal part is minimized. Electrical connections shall be so designed that contact pressure shall not be transmitted through insulating material.

7.2.12 **Terminal Cover:**

The terminals block cover for the energy meters shall be extended transparent type, which can be sealed independently of the meter cover. The ETBC shall have a clear space of min 40$\pm$5mm, thus allowing sufficient clearance space for inserting cables. ETBC shall have a top side hinge arrangement for easy access of terminal for wire termination. The terminals, their fixing screws and the insulated compartment housing them shall be enclosed by extended terminal cover in such a way that no part of meter or accessories at terminal block shall be accessible from the front of the meter. There shall be provision of fixing of seals so that screws cannot be loosened without breaking the seals.

The terminals shall not be accessible without removing the seal(s) of terminal cover when energy meter is mounted on the meter board.

The terminal cover shall have two sealing screws independent of each other. The fixing screws used on the terminal cover for fixing and sealing shall be kept captive in the terminal cover.

All parts of each terminal 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.

7.2.13 **Out Put Device:**

The requirements given in 6.11 of IS 14697 shall apply. Distinct LED/LCD indicators shall be provided for communication in progress.

The meter shall have a test output accessible from the front and be capable of being monitored with suitable testing equipment. The operation indicator shall be visible from the front. Common Test output device shall be provided in the form of LED output device. The relation between test output and the indication on display shall comply with the marking on the name plate (imp per kWh).

7.2.14 **Clearance and Creepage Distances:** The requirements given in **6.6** of IS 14697 shall apply.

7.2.15 **Resistance to Heat and Fire:** The requirements given in 6.8 and 12.4 of IS 14697 shall apply.

7.2.16 **Mechanical Requirements:** The requirements for mechanical shall be as per **12.3** of IS 14697 and the requirements for protection against penetration of dust and water shall be as per **6.9** and **12.5** of IS 14697 shall apply.

7.2.17 **Display of Values:** The information shall be shown with an electronic display. The requirements given in 6.10 of IS 14697shall apply.The non-volatile memory shall support retention period of 10 years.

7.2.18 **Terminal Arrangement:**

The terminals shall be marked properly on terminal block for giving external connections. A diagram of connections should be provided inside the cover the terminal block. The terminal cover shall be extended such that when it is placed in position it is not possible to approach the connections or connecting wires.

7.2.19 Connection Diagram:

Every meter shall be indelibly marked with connection diagram showing the phase sequence for which it is intended and shall be attached to the inner-side of the extended terminal block cover. In case of any special precautions need to be taken at the time of testing the meter, the same may be indicated along with the circuit diagram. The terminal cover shall be extended such that when it is placed in position it is not possible to approach the connections or connecting wires.

7.2.20 **Sealing Of Meter:**

Meter cover should be physically joined by seamless ultrasonic welding in such a way that meter cover cannot be opened without breaking and shall be physically evident as well as it should be logged as tamper event in case cover is opened. Reliable sealing arrangement should be provided to make the meter tamper evidence and avoid fiddling or tampering by unauthorized persons. For this, at least two (2) Nos. sealing arrangement on meter body, one (1) No. sealing arrangement on meter terminal cover , two No. seal on meter terminal cover ,one No. seal on MD reset button (if such button is provided) and one (1) No. sealing arrangement on communication port shall be provided. All the seals should be provided on front side only.

We have noted that rear side sealing arrangement shall not be preferred. The suppliers in their offer should explain the sealing arrangement.

7.2.21 **Marking of Smart Meter:**

7.2.21.1 The requirements given in **7** of IS 14697 shall apply. The following additional information shall also be provided as applicable in the name plate:

a) Communication technology for WAN or NAN (with carrier frequency).

b) Communication technology if IHD is supported (with carrier frequency).

Every meter shall be provided with a name-plate which shall be clearly marked/embossed as per clause-7 of IS:14697/1999. The name plate shall have following markings which shall be indelible, distinct and readable from outside the meter:—

(a) Purchaser's name, Purchase order No. and date with inscriptions or "PROPERTY OF DISCOM".

(b) Manufacturers name, Trade mark and place of manufacturer.

(c) Design & type.

(d) Nature of current and no. of phases and no. of wires for which meter is suitable for.

(e) The manufacturers serial no., year of manufacture and warrantee period. The serial no. is also to be marked on the meter base.

(f) Reference voltage

(g) Reference current

(h) Meter constant (if any)

(i) Class of accuracy

(j) Reference temperature

(k) Transformation ratios of instrument transformers (s) of which account is taken for meter constant.

7.2.21.2 **BIS Certification Marking:** The use of Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act,* 1986 and the Rules and Regulations made thereunder. The details of conditions under which the license for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

7.3 **Electrical Requirements:**

7.3.1 **Power Consumption:** The measurement of power consumption in the voltage and current circuits shall be determined as described in the followings.

7.3.1.1 **Voltage circuits:** The active and apparent power consumptions of a transformer operated Smart meter for each circuit at reference voltage, reference temperature, and reference frequency shall not exceed 5.0 W and 15 VA during the idle mode of communication module. This applies to either one NAN or one WAN module present in the smart meter. If a separate module for servicing to IHD is present, the above figures shall not exceed 6W and18VA during the idle mode of communication module. The additional power requirement during data transmission shall not exceed 7 W per communication module. The smart

meter shall be capable of sourcing additional power for powering the plugin communication module as agreed to between the buyer and the seller.

7.3.1.2 **Current circuit:** The apparent power taken by each current circuit of a CT operated smart meter at maximum current, reference frequency and reference temperature shall not exceed a maximum of 1 VA.

7.3.2 **Influence of Supply Voltage:** The requirements given in **9.2.1** and **9.2.2** of IS 14697shall apply.

Variation In Power Supply:

The meters shall be suitable for working satisfactorily with the following power supply system variations:—

Voltage Range:

(i)	Specified Operating Range	**:**	0.8 to 1.1 Vref.
(ii)	Limit Range of Operation	**:**	0.7 to 1.2 Vref i.e. –30% to + 20%

The meter shall be able to perform without any change in accuracy class with in the specified voltage range and shall also be within limits as prescribed in CBIP report no 304 and latest amendment thereof.

7.3.3 **FREQUENCY VARIATION:**

The standard reference frequency for performance of the meter shall be 50 Hz with tolerance +/-5% of rated frequency as CBIP report no. 304.

7.3.3 **Influence of Short —Time Over currents:**The requirements given in **9.2.3** of IS 14697shall apply.

7.3.4 **Influence of Self-Heating:**The requirements given in **9.3** of IS 14697 shall apply.

7.3.5 **Influence of Heating:**The requirements given in **9.4** of IS 14697 shall apply.

7.3.6 **Insulation Requirements:**The requirements given in **9.5** of IS 14697 shall apply.

7.3.7 **Immunity to Earth Fault:**The requirements given in **9.6** of IS 14697 shall apply.

7.4 **Electromagnetic Compatibility:** The requirements given in **10** of IS 14697 shall apply.

7.5 **Accuracy Requirements:** Class of accuracy of meter shall be 0.5S and shall conform to the requirements given in 11, 11.1, 11.2, 11.3,11.4,11.5, 11.6 and 11.7 of IS 14697 shall apply.

7.6 **Test and Test Conditions: Asper 9** of IS 16444 part-II

7.7 **Power Factor Range:**

The meter shall be suitable for Power factor range Zero–lag–Unit–Zero–Lead.

Apparent Energy shall be computed considering reactive (lag + lead)

i.e. Apparent Energy = $\sqrt{[\text{ Active Import Energy}]^2 + [\text{ Reactive Energy (Lag + Lead) }]^2}$

7.8 **Calibration and Test Output:**

The meter shall have a test output accessible from the front and capable of being monitored with suitable testing equipment. The operation indicator must be visible from front. However, it shall be possible to check the accuracy of energy measurement of the meter in the field by means of LED output on meter. Meter should have one / two calibration LEDs for accuracy measurement for different energies. Out of these, one should be kept fixed on kWh and other one shall be configurable for rest two (kVArh, kVAh). Resolution of the test output shall be sufficient to enable the starting current test in less than 10 minutes.

7.0 STARTING CURRENT:

The meter should start registering the energy at 0.1% of Ib.

9.0 Data Exchange Protocol: The requirements as per IS 15959 (Part 1) shall apply.The data exchange protocol chosen for Smart Meter shall be as per IS 15959 (Part 3) including specific requirements for Smart Meters for the application layer. This application layer protocol which is primarily DLMS/COSEM shall work through the other layers as given in **8 of IS 16444 PART-2**.

10.0 Communication Requirement: The requirement given in 8 of IS 16444 PART-2 shall apply.

11.0 Smart Meter Association Requirements: Clause 4 of IS 15959 PART 2 shall be applicable.

12.0 Push Services in Smart Meter: Clause 6 of IS 15959 PART 2 shall be applicable.

13.0 Advanced Security Profile: Clause 7 of IS 15959 PART 2 shall be applicable.

14.0 IP Communication Profile Support: Clause 8 of IS 15959 PART 2 shall be applicable.

15.0 Firm Ware Upgrade: Clause 9 of IS 15959 PART 2 shall be applicable.

16.0 Parameter List For Smart Meters: Clause 11 of IS 15959 PART 3 shall be applicable.Instantaneous parameters shall be as hereunder:

- Real time clock, date and time
- Current (I*R,IY,IB)*
- Voltage(VRN, VYN, VBN)
- Signed power factor,(R-phase , Y-phase,B-phase)
- Three phase power factor, PF
- Frequency – Hz
- Apparent power, kVA
- Signed active power, kW (+ Forward; – Reverse)
- Signed reactive power, kvar (+ Lag; – Lead)
- Number of power — failures
- Cumulative power — OFF duration in min
- Cumulative tamper, billing, programming count
- Billing date
- Cumulative energy, kWh (Import and Export)
- Cumulative energy kvarh-Q1,Q2,Q3, Q4
- Cumulative energy, kVAh (Import and Export)
- Maximum demand, kW (Import and Export)
- Maximum demand, kW (Import and Export) - Date & Time
- Maximum demand, kVA (Import and Export)
- Maximum demand, kVA (Import and Export) Date & Time
- Angle between all Phase (A,B and C) voltages

17.0 Block Load Profile Parameters: Clause 12 of IS 15959 PART 3 shall be applicable. Parameters shall be as hereunder:

- Real time clock, date and time
- Frequency
- Current (I*R,IY,IB)*
- Voltage (VRN, VYN, VBN)
- Block energy, kWh (Import and Export)
- Block energy, kWh (Net)
- Block energy, kvarh-(Q1,Q2,Q3,Q4)
- Block energy, kVAh (Import and Export)
- Communication Network Availability during the IP.
- Signal strength of communication network
- Status of Communication
- Average Signal Strength

Above parameters shall be measured and recorded at the end of each 15 min interval for last 60 days.

18.0 Daily Load Profile Parameters: Clause 13 of IS 15959 PART 3 shall be applicable. Parameters shall be as hereunder:

- Real time clock, date and time
- Cumulative energy kWh (Import and Export)
- Cumulative energy, kVAh (Import and Export)
- Cumulative energy kvarh--(Q1,Q2,Q3,Q4)
- Maximum Demand,Kw
- Maximum Demand,kw- date and time
- Maximum Demand,Kva
- Maximum Demand,kVA- date and time

Above parameters shall be measured and recorded at each midnight i.e. 00:00 hrs for last 60 days.

19.0 Billing Profile Parameters: Clause 14 of IS 15959 PART 3 shall be applicable.Parameters shall be as hereunder:

- Billing date
- System power factor for billing period import
- Cumulative energy, kWh (Import and Export)

- Cumulative energy, kWh (Import and Export) for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- Cumulative energy, kVAh (Import and Export) for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- MD, kW (Import and Export)
- MD KW (Import and Export)- Date and Time- for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- MD, kW (Import and Export) for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- MD kVA (Import and Export)- Date and Time- for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- MD, kVA (Import and Export) for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- Billing power ON duration in minutes (During billing period)
- Cumulative energy, kvarh-(Q1,Q2,Q3 and Q4)
- Tamper Count for Billing Period

Table 1

Time Zone	Time
TZ1	17.00 to 18.00 Hrs.
TZ2	18.00 to 22.00 Hrs.
TZ3	22.00 to 23.00 Hrs.
TZ4	23.00 to 05.00 Hrs.
TZ5	05.00 to 06.00 Hrs.
TZ6	06.00 to 08.00 Hrs.
TZ7	08.00 to 11.00 Hrs.
TZ8	11.00 to 17.00 Hrs.

The Billing Purpose Parameters Should Be Recorded and Should Be Available in Bill (History) For A Minimum Period of Last 12 Months.

20.0 Events: Clause 15 of IS 15959 PART 3 shall be applicable. Parameters shall be as hereunder:

20.1 Indian Event Reference Table —Voltage Related:

Occurrence and Restoration of following events:-

- Voltage Missing in any phase (R-Phase, Y-Phase, B-Phase)
- Over Voltage in any Phase (R-Phase, Y-Phase, B-Phase)
- Low Voltage in any Phase (R-Phase, Y-Phase, B-Phase)
- Voltage Unbalance

20.2 Indian Event Reference Table — Current Related:

Occurrence and Restoration of following events:-

- Current reverse in any phase (R-Phase, Y-Phase, B-Phase)
- Current unbalance
- Current bypass
- Over current in any phase
- Current Open in any phase (R-Phase, Y-Phase, B-Phase)

20.3 Indian Event Reference Table — Power Related:

Occurrence and Restoration of following event:-

- Power failure.
- Meter shall detect each occurrence and restoration of power Outage Event off if the phase voltage is absent.
- Smart Meters shall be capable enough to register Instantaneous Reading parameters (Cumulative KWh and KVAh) and Instantaneous Voltage(VRN, VYN, VBN) with every occurrence and restoration of power Outage Event.
- Total number of power On/OFF event to be stored shall be minimum 300 in FIFO basis.

20.4 Indian Event Reference Table —Transaction Related

- Real Time Clock – Date and Time
- Demand Integration Period
- Profile Capture Period
- Single-action Schedule for Billing Dates
- Activity Calendar for Time Zones
- New Firmware Activated
- RS485 device address
- LLS secret (MR) change
- HLS key (US) change
- HLS key (FW) change
- Global key change(encryption and authentication)
- ESWF change
- MD reset
- Metering mode
- Image activation single action schedule

- Configuration change to “Forwarded only” mode
- Configuration change to “Import and Export” mode

20.5 Indian Event Reference Table — Others:

Occurrence and Restoration of following events:-

- Abnormal external magnetic influence –Occurrence only
- 202 Abnormal external magnetic influence –Restoration only
- Neutral disturbance (HF, d.c. or alternate method)
- Low PF
- Plug in communication module removal –Occurrence
- Overload-Restoration

20.6 Indian Event Reference Table — Non-rollover Events:

Meter cover opening — Occurrence

20.7 Capture Parameters for Events

- Date and time of event
- Event code
- Current, IR
- Current, IY
- Current, IB
- Voltage, VRN/VRY
- Voltage, VYN
- Voltage, VBN
- Power factor, R-Phase
- Power factor, Y-Phase
- Power factor, B-Phase
- Cumulative energy, kWh

(Import)

- Cumulative energy, kWh

(Export)

- Cumulative tamper count

21.0 General Purpose Parameters: As per clause 16 of IS 15959 Part 3. The parameters shall be as hereunder:

21.1 Name Plate Details:

- Meter serial number

- Device ID
- Manufacturer name
- Firmware version for meter
- Meter type
- Category
- Current rating
- CTR
- PTR
- Meter year of manufacture

21.2 Programmable Parameters: Parameters shall be as hereunder:

- Real time clock – Date and time
- Demand integration period
- Profile capture period
- Single-action schedule for billing dates
- Activity calendar for time zones
- RS 485 Device address
- Image transfer
- Metering mode
- LLS secret
- HLS key
- Global key change
- Image activation singleaction schedule
- ESWF
- MD reset

22.0 Real Time Clock(RTC): As per IS 16444/ IS 15884 The clock day/date setting and synchronization shall only be possible through password/Key code command from one of the following:

- From remote server through suitable communication network.
- Hand Held Unit (HHU) or Meter testing work bench and this shall need password enabling for meter;

(The methodology for the synchronization would be as per requirement of utility)

23.0 Battery Backup: Meter shall be supplied with separate battery backup for RTC.

24.0 DISPLAY OF MEASURED VALUE:

The measured value(s) shall be displayed on seven segments, seven digit Liquid Crystal Display (LCD) display unit/register, having minimum character height of 10 mm for main digits. Dot- Matrix type LCD displays shall not be acceptable.

The data should be stored in non-volatile memory. The non-volatile memory should retain data for a period of not less than 10 years under unpowered condition. Battery back-up memory shall not be considered as NVM.

It should be possible to easily identify the single or multiple displayed parameters through symbols/legend on the meter display itself or through display annunciators.

The register shall be able to record and display starting from zero, for a minimum of 1500 hours, the energy corresponding to rated maximum current at reference voltage and unity power factor. The register should not roll over in between this duration.

The meter shall be capable of measuring accurately under balanced and unbalanced conditions at all Power Factures:

(1)	The real time and date	:	
(2)	Battery status	:	
(3)	Active Energy	:	KWH
(4)	Reactive Energy	:	KVARH
(5)	Apparent Energy	:	KVAH
(6)	Max. demand with date and time with 30 minutes integration period.	:	KVA
(7)	Cumulative Max. Demand	:	KVA
(8)	Max. Demand reset count.	:	Nos.
(9)	Average P.F. for a specified period	:	P.F.
(10)	Frequency	:	Hz.
(11)	Tamper and fraud details such as type of tamper, its duration and tamper-counts.	:	

25.0 <u>Display Parameters & Type of Display:</u>

Meter shall be capable of displaying above parameters in the following sequence within specified limits of errors for balanced or unbalanced load at all P.F. as mentioned here inafter:—

a) Auto Display Mode:

The meter shall be capable of recording and displaying automatically following data in order

1. Lamp Test
2. Real time
3. Date
4. Meter Serial Number
5. Current Active forwarded energy
6. Current Apparent forwarded Energy
7. Last Bill Active forwarded energy
8. Last Bill Apparent forwarded Energy
9. Current Month Max. Demand Active Forwarded
10. Current Month Max. Demand Apparent Forwarded
11. Last Bill Max. Demand in Active Forwarded (kW-Forwarded)
12. Last Bill Max. Demand in Apparent Forwarded (kVA –Forwarded)
13. Cumulative Max. Demand Active Forwarded
14. Cumulative Max. Demand Apparent Forwarded
15. MD reset count
16. Instantaneous Phase to Neutral Voltages (R,Y,B)
17. Instantaneous Line Currents (Amps.)
18. Instantaneous Power factor with sign for lag/lead
19. Supply Frequency.
20. Instantaneous Load Active
21. Instantaneous Load Apparent
22. Total Tamper occurrence events count
23. Cumulative Power-On hours
24. Cumulative Power off hours

b) Push Button Mode:

The following parameters shall be displayed on pressing the push button(s):

1. Display Test
2. Real Time
3. Date
4. Meter Serial Number
5. Active forwarded energy
6. Reactive forwarded energy (Lag)
7. Reactive forwarded energy (Lead)
8. Apparent forwarded energy
9. Last Bill Active forwarded energy
10. Last Bill Apparent forwarded Energy
11. Current Max. Demand in Active Forwarded (kW-Forwarded)
12. Current Max. Demand in Apparent Forwarded (kVA –Forwarded)
13. Last Bill Max. Demand in Active Forwarded (kW-Forwarded)
14. Last Bill Max. Demand in Apparent Forwarded (kVA –Forwarded)
15. Cumulative Max. Demand Active Forwarded
16. Cumulative Max. Demand Apparent Forwarded
17. MD reset count
18. Instantaneous Phase to Neutral Voltages (R,Y,B)
19. Instantaneous Line Currents (Amps.)
20. Instantaneous Power factor with sign for lag/lead

21. Supply Frequency.
22. Instantaneous Load Active
23. Instantaneous Load Apparent
24. Present PT Status
25. Present CT status
26. Present other status
27. Latest Occurrence of Tamper with date & time
28. Latest Restoration of Tamper with date & time
29. Total Tamper occurrence event count
30. High resolution active forwarded energy
31. High resolution apparent forwarded energy
32. Connection Check

Parameter value with relevant OBIS code should be made available on display. Meter should be supplied with Backlit LCD display the measured value(s) shall be displayed on seven segments, seven digit liquid crystal Display (LCD) display unit/register having minimum character height of 10 mm. The data should be stored in non volatile memory and should retain data for a period of not less than 10 (Ten) years under un-powered condition. Battery backup memory will not be considered as NVM. Meter shall have feature of connection check i.e. PT missing, CT reversal on meter display itself. PT missing & CT reversal shall be checked from looking on meter display. Meter shall have the facility to lock any parameter on display screen i.e. Scroll lock facility. The display of various parameters shall be continuously scrolling one after another. The display shall have ON time of at least 6 seconds for each measured value for auto-display cycling. The meter should have facility for a manual mode where the parameters can be read by push-button mode should have priority over auto display. The meter should have non-volatile memory, so that the registered parameters will not be affected by loss of power. The battery backup memory will not be considered as Non Volatile memory. It should be possible to easily identify the single or multiple displayed parameters through symbols/legend on the meter display itself or through display annunciator. The register shall be able to record and display starting from zero, for a minimum of 1500 hours, the energy corresponding to rated maximum current at reference voltage and unity power factor. The register should not roll over in between this duration.

26.0Special Requirement For Display:

26.1 The meter shall have indication for unsatisfactory/non-functioning of the following:—

a) Time and calendar

b) Real time clock with battery

c) All display segments

d) Non-volatile memory.

26.2 The meter serial number, C.T. and P.T. ratio and date with time of taking reading shall invariably be available at base computer software.

26.3 The meter shall be factory programmed for each and every month for minimum 20 years at the time of manufacture and correctness of 20 years calendar. In addition following parameters should also be factory programmed:—

a) CT/PT Ratio

b) Integration period

c) Display sequence

The meter shall have provision to be read through communication port in the absence of power through an external source. An **inductive coupling arrangement** shall be provided so that it should not be possible to damage the circuitry of the meter by applying excess voltage directly in the meter. The meter should be powered up using an external battery pack only in absence of power supply to the meter to enable taking of meter readings through display and optical communication port. If any bidder proposes for Internal Battery backup in the meter in case of mains supply failure for meter reading and meter data downloading, no power shall be consumed for this circuit when mains are available to recharge the battery. In case of power failure data downloading for Historical energy, maximum Demand & all the tamper events through CMRI (common meter reading instrument)shall be possible through battery internal/external backup. Rechargeable capacitor back up power shall not be used for display under Power absence condition. To verify that the sample meters are not having capacitor rechargeable battery, the samples will be kept in power off conditions for 7 days (168 hrs.) and then meters will be checked by pressing the push button and the CMRI shall be done."

While installing the meter, it shall be possible to check the correctness of the C.T. & P.T. connections to the meter and their polarity with the help of common meter reading instrument.

The meter and related instruments, when installed, shall be constructed in a way offering full protection against contact voltage, other hazards resulting from/or related to the operating principle and the utilization of the equipment. In particular if any metal part accessible while covers are in place, then the base shall be fitted with protective Earth terminal identified by the Earthing symbol ⊥ and connected to all accessible metal parts.

The Static Tri vector Meter shall measure and retain previous 12 months data (month wise) of the KWH and KVAH reading at 2400 Hrs. of the last day of each calendar months, Average Power Factor and maximum demand with date and time of occurrence of that particular month for all specified time zones. These parameters shall also be obtainable through common meter reading instrument whenever required of last 12 months

The meter should remain powered up and functional even when either of any two phases or any one phase along with neutral is available to the meter.

The meter shall be provided with an accurate **quartz crystal based real time clock**. The maximum drift permissible in the real time clock shall be ±5 minutes per year for class 0.5S Meters.

All the registers and other parameters shall be updated every second.
The meter should work accurately irrespective of phase sequence of the mains supply only in forward direction

The meter should continue to record satisfactorily as per prevailing electrical conditions even if the neutral of potential supply gets disconnected.

The meter shall record active energy in forward direction even if one or more CT's are reversed. The current vector direction shall always be considered as positive (import) for the computation of 3 Phase active energy which shall be added in the main active energy forwarded register. Mid night snap shot is required for configured energy (Apparent, Active, Reactive Lag and Reactive Lead) for last 35 days.

27.0 Maximum Demand Registration And Resets:

The meter shall continuously monitor and calculate the average maximum demand for each interval of time of 30 minutes and maximum of these shall be stored along with date and time when it occurred. The meter shall automatically store the 30 minute average demand. At the end of every 30 minutes, the new calculated demand should be compared with previous maximum demand and stored whichever of them is higher. The maximum demand for every calendar month along with the date and time when it occurred should be registered.

The maximum demand shall automatically reset at 24.00 Hrs. of the last date of each calendar Month for which minimum 20 calendar years shall be programmed by the manufacturer at his work.

The meter shall be provided with its own real time clock calendar with built in battery backup and time derived from this clock shall be used for maximum demand intervals. The meter shall display the maximum demand reset count.

27.1 Load Survey Requirements:

The meter shall be capable of recording following parameter for 35 days with 30 minute integration period.

- Active forwarded (Kwh)
- Apparent forwarded (KVah)
- Reactive forwarded Lag (KVarh lag)
- Reactive forwarded Lead (KVarh lead)
- Phase Voltage (V1, V2, V3)
- Phase Current (Ir,Iy,Ib)

The meter shall have test output device accessible from the front and capable of being read with suitable testing equipment. The output device may be either in the form of pulses or in the form of high resolution display.

The meter shall be possible to select either demand or energy view at the BCS end. The above load survey data should be available in the form of bar charts as well as in spreadsheets. The BCS shall have the facility to give complete load survey data both in numeric and graphic form.

The load survey data, abnormality event information and instantaneous parameters data shall all be retrievable through the meter's communication port and RJ 11 port through a common meter reading instrument (CMRI)/ Hand Held Unit/ Modem and shall be transferred (downloaded) to a PC with Windows based software to get complete details in numerical and/or graphic form. The necessary **base computer software (BCS)** for this purpose shall be provided by the supplier with complete details.

The meter shall be capable of storing KVA demands at 30 minutes interval for a minimum of last 35 days. The maximum demand in last 12 months with date and time of occurrence and tamper details as per clause 24.0 in its non-volatile memory and it shall be possible to transfer this data via a galvanically isolated optical communications port on to a base computer station through a Window/ DOS based CMRI or remotely using the remote communication interface as and when desired. Load profiles can be viewed graphically/ analytically with the help of meter application software. The offered meter

application software shall be capable of exporting these data for analysis to other user software in spreadsheet format (XML/Excel etc.).

28 Time Of Day (TOD) Tarrif:

28.1 Meter should be able to store apparent and active energies consumption along with maximum demand in KVA for at least different 8 time Zones.

28.2 Meter shall be able to record and store apparent and active energies, consumption along with maximum demand in KVA during specific peak hours described as following time Zone of register in sequence:—

a) 17.00 to 18.00 Hrs.

b) 18.00 to 22.00 Hrs.

c) 22.00 to 23.00 Hrs.

d) 23.00 to 05.00 Hrs.

e) 05.00 to 06.00 Hrs.

f) 06.00 to 08.00 Hrs.

g) 08.00 to 11.00 Hrs.

h) 11.00 to 17.00 Hrs.

28.3 The running TOD zone should be available on display by push and auto mode for information purpose.

28.4 The meter shall have facility for recording and storing of TOD consumption and maximum demand data on minimum Three Tariff Rates, per day basic.

28.5 It should be possible to change the time period for TOD recordings through the portable device or programmable BLOCK installed in the meter it self or manually with proper security. The main control for this change shall be available on the computer located at the Metering Office.

29 Communication Capability:

The meter shall also have facilities for data transfer locally through CMRI via an optically isolated communication port using serial communication. It should be possible to configure meter for TOD tariff demand integration period, billing date, real time clock and date etc. through CMRI locally without any extra cost to MVVNL, but the same shall be done by us only after taking due approval of MD, MVVNL or his authorized representative. The meters shall have a galvanically isolated optical communication ports as per IEC 1107 so that it can be easily reading instrument for data transfer. The meter shall have additional RJ11 port along with optical port for reading data through CMRI. Communication ports shall not be affected by any type of infection/unauthenticated signals. The baud rate should not be less than 9600 bps and higher baud rate shall be preferred for down loading the data. The complete data shall be downloaded within 6 minutes from meter to CMRI & from CMRI to BCS.

The bidder shall supply software required for local (CMRI) including required training to use the software free of cost. Separate communication cords for optical port and RJ11 port have to be supplied with each meter free of cost duly fitted with meter box with a provision of reading the data without opening the meter box. Also the meter box shall have provision at the meter body. The bidder shall provide meters as per DLMS compliance i.e. meters with open protocol as per IS:15959 Category “C” for consumer metering.

30 Software:

Software for reading, down loading data of the meter and TOD programming in the meter, normally resident in the Common Meter Reading Instrument (CMRI), software suitable for MS-DOS 5.0 or higher version. Windows based Base Computer Software (BCS) for retrieving data from CMRI and downloading instructions from base computer software to CMRI. This BCS should have, amongst other requirements and features and facilities described later in this specification, the facility to convert meter reading data into XML/ ASCII file format so that it may be possible for the user to integrate the same with the user's billing data and process the selected data in desired manner.

Necessary software for loading application program via CMRI serial port.

The following software shall be made available and installed on CMRI & BCS by the firm whose meters are to interface with CMRI without any extra charges. Any future up gradation in both the software shall be provided free of cost.

(a) Software to be resident in CMRI for the purpose of reading and programming the specific make(s) of static meters.

(b) Base computer stations (BCS) software for accepting data for CMRI, processing generating reports and down loading instruction from the BCS to CMRI. The firm shall also provide ASCII conversion utility along with BCS software for processing of the billing data.

(c) The firm shall install the above software without any extra cost on call from one of the Test Division located in each of the Zones. The purchaser will arrange these software installations in rest of the existing and future Test Divisions for which necessary softcopies with appropriate licences shall be provided by the firm.

(d) It should not be possible to re-program the meter at site (write facility through optical port) without authenticated password. The meter programming through optical port shall not be acceptable except time of day (TOD) and real time clock (RTC). Provision for programming of TOD and RTC shall necessarily be provided.

(e) For efficient and speedy recovery of data read through CMRI, view & analysis, a Base Computer Software (BCS) shall have to be supplied having the following features:

The BCS software shall be windows based user friendly. The data transfer shall be highly reliable and fraud proof. Base Computer software shall give all details adequate for analysis and abnormal event data & load surveys parameters. The software shall have the facility to convert all the consolidated information / data of selectable parameters into ASCII format. EDP department of purchaser can generate its own DBF (data base files) to downloaded all the required information into it.

(i) Platform:

The BCS shall be executable on MS WINDOWS, WINDOW XP or higher updated operating platform or higher operating system. The BCS shall be suitable to run on IBM PC or compatible hardware platform.

(ii) Meter Data Display:

The software shall show electrical condition existing at the time of reading the meter in tabular forms as well as graphical format (Phase diagram with phase angle).

All the information about energy, maximum demand and their respective TOD register reading, billing register readings shall be shown in a manner which user can easily understand.

All the load survey data shall be available in numerical as well as graphical format. It shall be possible to view this data daily, weekly, and monthly format. The load survey graph shall show values where the cursor is placed for the selected or for all parameter.

All the information about abnormality events shall be accompanied with date and time stamping of respective electrical conditions. This information shall be displayed in the sequence in which it happened in cumulative format as well as summary format.

BCS should display the Date and Time of meter reading in the computer. The software shall be capable of preparing CMRI to read the meter information or time setting of the meter.

Support Display:

There shall be "user friendly" approach for viewing meter data for the reading collected now or for the reading collected in the past. All information about a particular consumer shall be sorted out and available at one place so that locating any consumer's past data is easy. It shall be possible to retrieve/locate data on the basis of either one of the following particulars:

a) Site‘s ID/Numbers.

b) Meter Sr. No.

c) Date of meter reading.

d) Location.

BCS of the bidder should support the supplied meters of it own make.

(iii) The Data Transfer:

It shall be possible to transfer data to and fro from CMRI through serial interface.

(iv) Configurability:

It shall be possible to have selective print out of all available data of the meter. Print out shall not include anything and everything available with the BCS. The software shall support "print wizard" whereby user can decide what to print out. The use of the software need not revert back to the supplier of the software for modifying the software just to print what he desires.

BCS shall have facility to export data to ASCII or spreadsheet format for integrating with the purchaser's billing system. Here again an "Export wizard" or similar utility shall be available whereby user can select file format, what data to export, the field width selection etc.

(v) Security:

The BCS shall have multilevel password for data protection and security. The first level shall allow the user to enter the system. The different software features shall be protecting by different passwords. The configurable of passwords shall be user definable. The software installed on one PC shall not be capable on another PC.

(vi) Help:

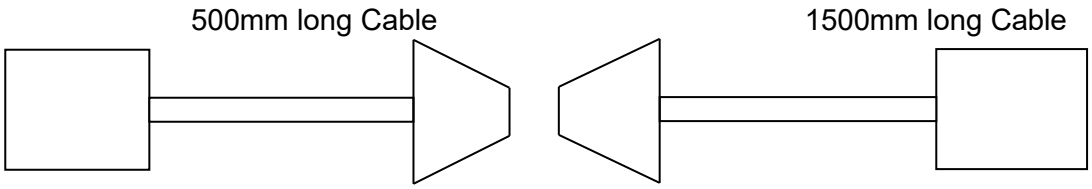
The exhaustive online help shall be available with the software so that user can use all the features of the software by just reading the help contents.

Necessary software for loading application program via CMRI through serial port. Also meter reading data downloading facility directly from meter to laptop with 1 cord per 1000 meter shall be provided with desired software.

Interface With MS Dos Based Cmri:

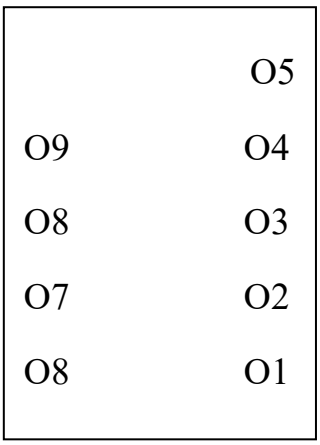
For Physical interface between meter and Common Meter Reading Instruments shall consist of meters optical sensor terminating into a 9 Pin D type male connector with a cable of 500mm + 10mm length with a provision of reading the data without opening the meter box. Also additional RJ11 port at the meter body shall have sealing provision.

Illustration No.1



Optical Port for connecting to Meter 9 pin Male 9 pin female Connection to CMRI

The configuration of 9 Pin D type male connector shall be as given below:



PIN	SIGNAL NAME
01	NC
02	TRANSMIT DATA (TXD)
03	RECEIVE DATA (RXD)
04	NC
05	SIGNAL GROUND (SG)
06	NC
07	NC
08	NC
09	POWER SUPPLY

Illustration No.2

1500mm long Cable

Connection to CMRI 9 Pin Female connector to
Base Computer Station (BCS)

31.0 Drawing And Manual:

31.1 The firm is required to submit one copy of drawing and manual with the tender documents and in each packing case of energy meters for use of field offices.

31.2 Maintenance and repair manuals including instructions for testing adjustments and calibration shall be submitted with the contractual documents.

20 Inspection And Testing:

32.1 All meters shall be duly tested and sealed by the firm at their premises prior to inspection. Manufacturer seal may be provided on one side of meter. For the other side, the seal with engrave as Utility name may be sent in a pack for provision by utility after completion of test by the utility & after receipt of the meter.

The utility/ purchaser may inspect the meter randomly as per sampling plan for acceptance test as per IS 16444 part-2. The meters shall be tested for all functional requirements as part of acceptance test as per IS 16444 Part-2. After testing, these sample meters shall be additionally sealed and would be kept in safe lock for verification if needed.

32.2 The manufacturer shall have NABL accredited laboratory to ensure accurate testing calibration as per IS 14697 for acceptance test.

32.3 Each lot of meters offered for supply shall be inspected for routine/ acceptance and anti tamper feature test at manufacturers' works to verify that these are being supplied in accordance with relevant standards/ technical specification and guaranteed technical particulars.

32.4 Inspection of material shall be carried out by the representatives of Superintending Engineer (MM)/Chief Engineer (CS/CP), MVVNL, Lucknow.

32.5 While offering a lot for inspection/testing, confirmation to the effect that meter have successfully withstood to routine/ acceptance and anti tamper feature test, (Enclosing test results) alongwith packing list shall be submitted to Superintending Engineer (MM), MVVNL, Lucknow as well as to purchaser.

At the times of inspection and testing the firm shall however submit all routine test results of all meters offered, to the inspection officer.

32.6 All instruments used in inspection and testing should be properly calibrated and sealed once a year. Calibration Certificate when demanded by the inspecting officer shall be provided / produced for verification

purposes. In case of any dispute regarding calibration, instruments shall be sealed and signed by the representative of the firm and purchaser and will be sent to test house Government lab/ Government Institution of repute, for calibration at the cost of firm.

32.7 Purchaser reserves the right to get the meters inspected/ tested before dispatch by any Independent Inspecting Agency, at the cost of purchaser.

33.0 Type Test:

Smart meter shall be type tested for all the type tests as per IS: 16444 (latest version) in a third party independent lab. The number of sampling for testing of meters and criteria for conformity would be as per IS 16444 part-2. Necessary copies of test certificates shall be submitted as per agreement with the utility.

33.1 Schedule Of Type Test Shall Be As Follows:

33.1.1 Test of Insulation Properties:

(a) Impulse voltage test

(b) a.c. High voltage test

(c) Insulation resistance test

33.1.2 Test of Accuracy Requirements:

(a) Test on limits of error

(b) Interpretation of test results

(c) Test of meter constant

(d) Test of starting condition

(e) Test of no-load condition

(f) Test of ambient temperature influence

(g) Test of repeatability of error

(h) Test of influence quantities

33.1.3 Test of Electrical Requirement:

(a) Test of power consumption test

(b) Test of influence of supply voltage

(c) Test of influence short-time over currents

(d) Test of influence of self-heating

(e) Test of influence of heating

(f) Test of influence of immunity to earth fault

33.1.4 Test for Electromagnetic Compatibility:

(a) Radio interference measurement

(b) Fast transient burst test

(c) Test of immunity to electrostatic discharges

(d) Test of immunity to electromagnetic HF field

(e) Surge Immunity Test

(as per Clause 7.2.6 of **IEC62052**-11)

33.1.5 Test for Climatic Influences

(a) Dry heat test

(b) Cold test

(c) Damp heat cyclic test

33.1.6Test for Mechanical Requirement

(a) Vibration test Shock test

(b) Spring hammer test

(c) Protection against penetration of

(d) dust and water

(e) Test of resistance to heat and fire

NOTE — Following tests shall be carried out to assess for smart meter functional condition and functionality of communication module after the 'Type test and acceptance test' for metrology is carried out but before 'Test of resistance to heat and fire':

a) Accuracy of the meter at pre-defined points [5 percent *I*b,*I*b and *I*max] UPF.

b) Manufacturer shall demonstrate the functionality of communication module by data read test, that is readingkWh energy register through the communication module.

34.0 Influence Of High Magnatic Field Asper CBIP Technical Report No. 88 (Revised June 2000 or Latest Revision) Read With 3rd Amendment/Errata Feb. 2002

Meter Shall be provided with appropriate magnetic shielding so that any external magnetic field (A.C. electromagnet or D.C. magnet) as per the values specified in CBIP report no. 304 (amended), applied on meter would not affect the proper functioning of meter. Also when magnetic field such as 0.5 Tesla is applied on the meter (which is above the immunity level as defined in CBIP report), it shall record at I max. at UPF.

Influence of Spurious signal : The meter should record accurately in case of DC or spurious signal through neutral and meter should log such condition with date and time. If influenced.

Note: Any other type test if included in IS/IEC/CBIP standard (latest revision) or test as per revised limits have to be done on PROTO-TYPE sample meter.

35.0 The firm shall supply the meter as per specification/drawing as type tested. If any change in the design/parameters is being made, then the meter shall have to be type tested again at the cost of the firm.

36.0Routine Test:

All the meters offered for supply shall be tested by the manufacturers at their works so as to conform that these are being manufactured in accordance with the technical specification/ISS. A copy of these routine test results shall be enclosed alongwith the packing list at the time of offering the material for inspection. The Factory Acceptance and Routine tests shall be carried out as per IS 16444 part-2. Apart from above test, meter shall be also be tested for all functional requirement through communication as part of acceptance test.

37.0 **Acceptance Tests:**

Shall consist of the following :

(a) A.C. Voltage test

(b) Insulation resistance test

(c) Test on limits of errors

(d) Test on meter constant

(e) Test on starting condition

(f) Test of no-load condition

(g) Repeatability of error test

(h) Test of power consumption

(i) Vibration test

(j) Shock test

(k) Tamper proof test

38.0 Number of Samples and Criteria for Conformity:

Type tests shall be applied to three test specimens. Inthe event of one specimen failing to comply inanyrespect, further three specimens shall be taken, all ofwhich shall comply with the requirement ofstandards.Additional one sample for test for data exchangeprotocol shall be submitted.

The requirement given in **12** of IS 14697 shall apply

NOTE — Smart meter is to be submitted along withcommunication module in its place as integral part of the meter.

39.0 Display:

Minimum 7 digits LCD display. For testing purpose, high resolution display having at least 3 decimal digits shall be provided.

40.0 Test for Data Exchange Protocol

This test shall be carried out on optical port as per IS 15959 (Part 3) Table 27 (List of tests Category D3 Transformer operated three phase a.c. static watthour smart meters for HV/LV consumer application) and Table 28 (List of tests for Category D4 Transformer operated three phase a.c. static watthour smart meters for Boundary/Bank /Ring /ABT metering application).

The test shall be performed on a separate sample.

41.0 Tests for Smart Meter Communicability

41.1 The modules for WAN/NAN/IHD shall beapproved by designated agency authorized by DoT andshall have ETA as mentioned in **8.2 of IS 16444 PART-2**.

41.2 *Test for Smart Meter Communicability:*

Test for Smart meter communicability shall be carried out as per the provisions of **28** of IS 15959 (Part 3).

NOTE — This note is optional test to be mutually decided between the buyer and the seller.

42.0 Smart Meter Functional Requirements:

The smart meter developed as per this standard is required to support handling of following operational requirements:

42.1 Smart meters shall respond to the following:

a) Meter readings on demand from HES,

b) Scheduled meter reading from HES,

c) Remote Firmware upgrade from HES, and

d) All programming requests from HES.

42.2 Smart meter shall detect 'First breath (power on)and Last gasp (power off)' condition and communicate to HES.

43.0 **Other General Requirement:**

(a) The meter shall be designed in a way to ensure continuity of supply and reliability, providing facilities for inspection, testing and calibration, maintenance and repair. They shall operate without undue vibration and the least amount of noise.

(b) They must so designed to be unaffected by normal sea, air or land transport requiring no recalibration before, installation and routine or type tests.

(c) The frame supporting metering elements shall be unique, single piece sufficiently rigid

(d) Material shall be packed generally in accordance with clause 9.1 (Annexure-E) of ISS: 13010:1990.

(e) Accompanying devices and accessories shall be placed inside a shock absorbing, protective carton box or expanded polystyrene moulding. One carton box or expanded polystyrene moulding may be used to accommodate not more that four Nos. Energy Meters.

(f) The meters and devices in boxes or mouldings shall be carefully packed for overseas shipment in sturdy wooden cases capable to be stored outdoor without further protection against weather conditions (Rain or humidity).

(g) Meters in the original packing shall be unaffected by normal sea, air or land transport and should be ready to be installed and operate reliably and accurately immediately after unpacking.

(h) The meters shall be suitably packed for vertical/horizontal support to withstand handling during transportation.

(i) The meter shall be packed appropriately to ensure safe transportation, handling, identification and storage.

(j) All packing materials shall be as per environment law in force. The primary packing shall ensure protection against humidity, dust, grease and safeguard the meter's performance until its installation.

(k) The secondary packing shall provide protection during transportation.

(l) The packing case shall indicate "Fragile in nature" and direction of placement of box.

(m) Each packing shall indicate marking details like Manufacturer's name, S.No. of meters, quantity etc.

(n) The meter shall be compact in design. The meter block unit shall be capable of withstanding stresses likely to occur in actual service and rough handling during transportation.

(o) The meter shall be convenient to transport and immune to shock and vibration during transportation and handling.

(p) The meter should not be exposed to undue shock and mishandling during transportation.

(q) The stacking of box inside transport media should be such as to avoid their free movement.

(r) The packing should also be protected from rain and dust by transport media.

(s) The Bidder shall be responsible for any damage during transit due to inadequate or improper packing.

44.0 Spare Parts:

(a) Availability of spare parts shall be guaranteed by the firm for a period of 10 years after the delivery of each items.

(b) The firm or their collaborators or their authorised agents should have service facilities alongwith adequate spare parts in India to provide prompt service initially for a period of 10 years.

45.0 After Sales Service:

After Sales Services, as and when required shall be provided by the firm to the purchaser directly through their own qualified Engineer and it will also be their responsibility to educate MVVNL staff by demonstration and detailed technical instruction as mutually agreed upon at different sites (Zonal Headquarters) in the State of U.P. for 66 months from the date of last dispatch.

46.0 Technical Specification and Guaranteed Technical Particulars:

The material shall be manufactured and tested in accordance with specific requirement of these specifications of Static Trivector Meters and Guaranteed Technical Particulars (GTP).

47.0 Method/Programme to Be Adopted for Loading of Meter Software Programme in MS Dos Based Meter Reading Instruments:

It shall be the responsibility of the supplier to load their software programme in MS DOS Based CMRI of any other make, on the Computer installed/to be installed in various office of UPPCL as per request received directly from field units or Purchaser without any extra charges.

The coordination for this purpose between supplier of MS DOS Based CMRI's and Static Trivector Meter respectively, shall be made by purchaser.

48.0 Period Of Guaranty and Performance:

(a) The firm shall undertake a guarantee for 60 months from the date of installation and 66 months from the date of supply, replace within one month of receipt of report of the meter, which are found defective/ inoperative at the time of installation. (This clause should be read with clause should be read with clause No. 1.2.5 of instructions to tenderers/ clause 30 of Form B.

(b) In case of any discrepancy between the specification and relevant standards, previsions contained in this specification shall prevail.

49.0 Sample Meter :

Three no sample meter of AC CT operated 3 phase 4 wires and CT-PT Operated A.C. Three Phase Four Wire Smart Energy Meter along with type test report must be submitted with the offer. Sample meters of the firms meeting pre-qualifying condition of the tender, shall be tested at any of the Government Lab, as per technical specification and relevant IEC/IS. However right to have meter tested at any Test lab of DISCOM/UPPCL is reserved with purchaser. Date of testing will be informed to all bidders. Engineer of the bidder shall come with BCS and CMRI so that tamper information with date & time, load survey and meter readings could be downloaded by CMRI and printout could be taken to verify the internal features also. Part-II will be opened for only those bidders whose sample meters will pass in testing.

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7.2 Technical Specifications For 3 PHASE, 4 WIRE A.C. STATIC Smart Meter (10-60 Amps) DIRECT CONNECTED CLASS 1.0 With Bi Directional Communication Facility Suitable For Advanced Metering Infrastructure (AMI).

1.0 Scope:

This specification covers the design, manufacture, assembly, inspection, testing at manufacturers works before dispatch, supply and delivery at site/FOR destination anywhere in " state" of Class 1.0 accuracy static whole current electronic smart meter of current range 10-60 Amps with bidirectional communication facility for tariff purpose along with other associated equipment as per requirement given in this specification.The meter shall be suitable for Advanced Metering Infrastructure (AMI). Meter shall have provision for pluggable and interchangeable NIC (RF Mesh/ NBIoT/5G-4G-2G) i.e as per field based requirement NIC of either type can be used without changing the meter. The meter shall communicate to DCU based on RF mesh network and DCU with HES on WAN through NBIoT communication technology with fallback arrangement to available communication technology in sequence of 5G-4G-2G mentioned in IS16444 and Functional Requirements of AMI in India and as per the requirement of the utility.

2.0 Standard:

The meters with accuracy class–0.5S are required measurement of Active Energy and shall conform to the latest edition of following standards Unless otherwise specified elsewhere in this specification, the performance and testing of the meters shall conform to the following standards latest amendments thereof:—

IS 13779/ 1999 with latest revision thereof	:	Specification of AC Static Watt hour meters, class 1.0 & 2.0.
IS : 9000 with latest revision thereof	:	Basic Environmental Testing Procedures for Electronic & Electrical items.
IS 12346 (1999) with latest revision thereof	:	Specification for testing procedure for electrical and electronic items.
IS 11000 (1984) with latest revision thereof	:	Fire hazard testing

IEC 62052-11 with latest revision thereof	:	Electricity metering equipment (AC) – General requirements, tests and test conditions, Metering equipment
IEC 62053-21: with latest revision thereof	:	A.C. Static Watt hour meter for active energy Class 1.0 and 2.0
IEC 60068	:	Environmental testing
IEC 61036-1996	:	Specification for AC static Watt-hour Meters, Class 1 & 2.
CBIP Technical Report no. 111	:	Specification for Common Meter Reading Instrument.
CBIP 304: read with latest revision thereof	:	Standardization of AC Static Electrical Energy Meters, publication no. 304
IS: 14772/2000:	:	General requirement for enclosures for accessories for household and similar fixed electrical installation specification.
IS: 15707(2006):	:	Testing evaluation installation and maintenance of AC electricity meter code of practice.
IS 15959 (Part 1):2011 read with latest revision thereof	:	Data exchange for electricity meter reading, tariff and load control - Indian Companion Standard
IS 15959(Part 2):2016 read with latest revision thereof	:	Data Exchange for Electricity Meter Reading, Tariff and Load Control — Companion Specification
IS 16444 with latest revision thereof	:	AC Static Direct Connected Watthour Smart Meter class 1 and 2
CEA Regulation (2006) with latest revision thereof	:	Installation and Operation of meters Dtd: 17/03/2006
CEA Guidelines regarding Smart Metering	:	Functional Requirements of Advance Metering Infrastructure AMI in India
	:	Guidelines For Comminication System Of Smart Meters Plc ,Rf, Cellular Network (3g/4g)

Meter matching with requirements of other national or international standards which ensure equal or better performance than the standards mentioned above shall also be considered. When the equipment

offered by the tenderer conforms to standards other than those specified above, salient points of difference between standards adopted and the standards specified in this specification shall be clearly brought out in the relevant schedule.

3.0 Basic Features:

The Smart Meter would have the following minimum basic features/services-

- Measurement of electrical energy parameters,
- Bidirectional Communication,
- Tamper event detection, recording and reporting,
- Power event alarms such as loss of supply, low/ high voltage,
- Remote firmware upgrade from HES,
- Remote Connect/Disconnect from HES,
- Net metering features,
- On demand reading from HES,
- Scheduled Meter Reading From HES,
- All programming requests from HES,
- Smart meter association requirement,
- Push services,
- Advanced security profile,
- Communication profile,
- Parameter list for smart meters,

4.0 Communication:

The meter shall communicate to DCU based on RF mesh network and DCU with HES on WAN through NBIoT communication technology with fallback arrangement to available communication technology in sequence of 5G-4G-2G mentioned in IS16444 and Functional Requirements of AMI in India and as per the requirement of the utility.. Meter shall have provision for pluggable and interchangeable NIC (RF Mesh/ NBIoT/5G-4G-2G)i.e as per field based requirement NIC of either type can be used without changing the meter.The plug-in module shall be field swappable with suitable integrated communication module as agreed between buyer and the seller. This module should be able to connect NAN or WAN (as per the plugged module RF Mesh/ NBIoT/5G-4G-2G) for two-way communication. The meter shall log communication module removal /non responsive event with snapshot.

5.0 Climatic Conditions:

The meters to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.Meters shall be capable of maintaining required accuracy under hot, tropical and dusty climate.

a)	Maximum ambient air temperature in shade.	50 Deg. C
b)	Minimum ambient temperature	(-) 5 Deg. C
c)	Maximum relative humidity	95%
d)	Minimum relative humidity	10%

e)	Height above mean sea level	Up to 1000 meters.
f)	Dust storms likely to occur	March to July.
g)	Average number of thunder storm days per annum	50
h)	Average number of tropical monsoon(conditions)	4 months
i)	Average annual rain fall	10 cms to 100 cms.
k)	Seismic level(Horizontal accn)	0.30g
l)	Isoceraunic level (days per year)	40
m)	Average No. of rainy days per annum	60
n)	Maximum Annual Rainfall	750mm
o)	Rainy Months	June to Oct.
p)	Altitude above MSL not exceeding	300 meters
q)	Wind Pressure	126 kg/sq m

The temperature range and relative humidity for performance of meters shall be as per relevant standards.

7.0 Current And Voltage Rating:

Rated voltage (Vref)	3 x 240 V - Phase to Neutral (3 phase 4 wire system) 3 x 415 V - Phase to Phase
Rated current (Ib) (connected through	Basic current 10A (Ib), Maximum current-60 Amps (Imax.)

8.0 Metering:

8.1 Metering Requirement:

Metering and metrology requirement shall be according to IS 13779.

8.1.1 Classification:

The classification as per **4** of IS 13779 shall apply.

8.1.2 Ratings:

8.1.2.1 **Standard reference voltage:**As per **5.1** of IS 13779 and shall be as following:

Meters for	**Standard Exceptional Reference Voltage Values (V)**	**Exceptional Values (V)**
Connection through voltage transformer	240(415)	250(433)

8.1.2.2 **Standard Basic Currents:** As per **5.2** of IS 13779 the basic currents shall be 10 A for 3 phase 4 wires Smart Energy Meter **.**

8.1.2.3 **Maximum current:** As per **5.3** of IS 13779 the rated maximum current for the meter shall be 60 Amps (600 % Ib) at which the meter purports to meet the accuracy requirement.

8.1.2.4 **Standard reference frequency:** As per **5.4** of IS 13779 Standard value for reference frequency is 50 Hz.

8.2 **General Constructional Requirements:** The requirements given in **6.1** to **6.4** of IS 13779 shall apply. The communication modules shall be plug in type as mentioned in **1.2 of IS 16444**. The plug-in communication modules shall be properly secured on the smart meter, both physically and electrically, so as to avoid any possible tampering with adequate provision for sealing.For Terminals-Terminal Block(s) — Protective Earth Terminal the requirements given in **6.4** of IS 13779 shall apply.For Terminal Cover the requirements given in **6.5, 6.5.1, 6.5.2** and **6.7** of IS 13779 shall apply.

8.2.1 Meter shall be designed and constructed in such a way as to avoid introducing any danger in use and under normal conditions so as to ensure specially the following:—

6. Personnel safety against electric shock
7. Personnel safety against effects of excessive temperature.
8. Protection against penetration of solid objects, dust and water.
9. Protection against spread of fire.
10. Detection against fraud or pilferage.

There should not be any screws in the meter body through which meter can be opened and tampered without breaking the seal.

8.2.2 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.

8.2.3 The meters shall be designed with application specific integrated circuit and shall be manufactured using SMT (Surface Mount Technology) components. Power supply and voltage divider circuits may be of PTH technology.

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

8.2.5 The meter shall have an operation indication device such as a blinking LED. The operation indicator shall be visible from the front window and capable of being monitored conveniently with suitable testing equipment.

8.2.6 The meter shall conform to the degree of protection IP 51 of IS:12063/IEC:529 for protection against ingress of dust, moisture and vermin.

8.2.7 The meter shall be supplied with a transparent extended terminal block cover (ETBC) with proper sealing arrangement.

8.2.8 The meter shall have seamless ultrasonically welded insulated body, along with unidirectional screws and wall mounted projected type to be fitted with the help of screws.

8.2.9 The meter-base, meter cover, terminal block and ETBC shall be made of unbreakable, high grade, fire resistant, reinforced, non-flammable, polycarbonate or equivalent high grade and good quality engineering plastic.

8.2.10 **Out Put Device:**

The requirements given in 6.11 of IS 13779 shall apply.

The meter shall have a test output accessible from the front and be capable of being monitored with suitable testing equipment. The operation indicator, if fitted, must be visible from the front. Test output device shall be provided in the form of LED output device. The relation between test output and the indication on display shall comply with the marking on the name plate (imp per kWh)

8.2.11 **Clearance and Creepage Distances:** The requirements given in **6.6** of IS 13779 shall apply.

8.2.12 **Resistance to Heat and Fire:** The requirements given in 6.8 and 12.4 of IS 13779 shall apply.

8.2.13 **Mechanical Requirements:** The requirements for mechanical shall be as per **12.3** of IS 13779 and the requirements for protection against penetration of dust and water shall be as per **6.9** and **12.5** of IS 13779 shall apply.

8.2.14 **Display of Values:** The information shall be shown with an electronic display. The requirements given in 6.10 of IS 13779 shall apply.The non-volatile memory shall support retention period of 10 years.

8.2.15 Connection Diagram:

The connection diagram of the meter shall be clearly shown on inside portion of the terminal cover. The meter terminals shall also be marked and this marking should appear in the above diagram.

8.2.16 **Sealing Of Meter:**

Meter cover should be physically joined by ultra sonic welding on both sides in such a way that meter cover cannot be opened without breaking and shall be physically evident as well as it should be protected thorough cover open switch. It shall be displayed and as well as recorded in MRI. Reliable sealing arrangement should be provided to make the meter tamper evidence and avoid fiddling or tampering by unauthorized persons. For this, at least two (2) Nos. seals on meter body, one (1) No. seal on meter terminal cover and one (1) No. seal on communication port and scroll push button shall be provided. All the seals should be provided on front side only. Rear side sealing arrangement will not be preferred. The suppliers in their offer should explain the sealing arrangement.

8.2.17 **Marking of Smart Meter:**

7.2.17.1 The requirements given in **7** of IS 13779 shall apply. The following additional information shall also be provided as applicable in the name plate:

a) Communication technology for WAN or NAN (with carrier frequency).

b) Communication technology if IHD is supported (with carrier frequency).

c) Symbol of Load Switch.

Every meter shall be provided with a name-plate which shall be clearly marked/embossed as per clause-7 of IS:13779/1999 and . IS:15959. The name plate shall have following markings which shall be indelible, distinct and readable from outside the meter:—

(a) Purchase name, Purchase order No. and date with inscriptions or "PROPERTY OF MVVNL".
(b) Manufacturers name, Trade mark and place of manufacturer. (c) Designed of type.
(d) Nature of current and no. of phases and no. of wires for which meter is suitable for.
(e) The manufacturer's serial no., year of manufactures and warrantee period.
(f) Reference voltage
(g) Reference current
(h) Meter constant (if any) (i) Class of accuracy
(j) Reference temperature
(k) Transformation ratios of instrument transformers (s) of which account is taken for meter constant.

(l) Bar

Bar code as per 128 C format shall be provided on the plate inside meter
Meter serial number to be written in

17.2.17.2 The use of Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the license for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

8.2.18 The terminal block, the ETBC and the meter case shall ensure reasonable safety against the spread of fire. They should not be ignited by thermic overload of live parts in contact with them.

8.2.19 The terminal block shall be of high grade non-hygroscopic, fire retardant, low tracking, fire resistant, reinforced poly-carbonate (not Bakelite) or equivalent high grade engineering plastic which should form an extension of the meter case and have terminal holes and shall be of sufficient size to accommodate the insulation of the conductors, meeting the requirement of IS 13779:1993/CBIP technical report- 304

8.2.20 The terminals shall have suitable construction with barriers and cover to provide firm and safe connection of current and voltage leads of stranded copper conductors or copper reducer type terminal ends (thimbles). The terminal cover shall enclose the actual terminals, the conductor fixing screws, the external conductor and their insulation.

8.2.21 The manner of fixing the conductors to the terminal block shall ensure adequate and durable contact such that there is no risk of loosening or undue heating.

Screw connections transmitting contact force and screw fixing which may be loosened and tightened several times during the life of the meter shall be such that the risk of corrosion resulting from contact with any other metal part is minimized. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material. The internal diameter of the terminal holes shall be 8.5 mm minimum , depth of terminal hole shall be 25 mm.The clearance and creepage distance shall conform to relevant clause of IS 13779:1993/CBIP technical report no.-304.

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

8.2.23 The potential link shall not be provided out side on meter terminal block.

7.4 **Electrical Requirements:**

8.3.1 **Power Consumption:** The measurement of power consumption in the voltage and current circuits shall be determined as described in the followings.

7.3.1.1 Voltage circuits: The active and apparent power consumptions of a direct-connected composite Smart Meter for each circuit at reference voltage, reference temperature, and reference frequency shall not exceed 5.0 W and 15 VA during the idle mode of communication module. This applies to either one NAN or one WAN module present in the Smart Meter. If a separate module for servicing to IHD is present, the above figures shall not exceed 6W and 18VA during the idle mode of communication module. The additional power requirement during data transmission shall not exceed 7W per communication module. In the case of plug in communication modules, the Smart Meter shall be capable of sourcing 7W for powering the plug in communication module during data transmission.

7.3.1.2 Current circuit: The apparent power taken by each current circuit of a direct-connected smart meter at maximum current, reference frequency, and reference temperature shall not exceed a value in VA equivalent to 0.08 percent of *V*ref in volts multiplied by 100 percent of *I*max in amperes (for example 230 V and 60 A gives 11 VA; 230 V and 100 A gives 18.4 VA).

8.3.2 **Influence of Supply Voltage:** The requirements given in **9.2.1** and **9.2.2** of IS 13779 shall apply.

Variation In Power Supply:

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

Specified operating range	0.8 to 1.1 V ref.
Limit range of operation	0.6 to 1.2 V ref.

8.3.3 **FREQUENCY VARIATION:**

The standard reference frequency for performance of the meter shall be 50 Hz with tolerance +/-5% of rated frequency as CBIP report no. 304.

8.3.4 **Influence of Short —Time Over currents:**The requirements given in **9.2.3** of IS 13779 shall apply.

8.3.5 **Influence of Self-Heating:**The requirements given in **9.3** of IS 13779 shall apply.

8.3.6 **Influence of Heating:**The requirements given in **9.4** of IS 13779 shall apply.

8.3.7 **Insulation Requirements:**The requirements given in **9.5** of IS 13779 shall apply.

8.3.8 **Immunity to Earth Fault:**The requirements given in **9.6** of IS 13779 shall apply.

7.4 Electromagnetic Compatibility: The requirements given in **10** of IS 13779 shall apply.

7.5 Accuracy Requirements: Class of accuracy of meter shall be 1.0 S and shall conform to the requirements given in 11, 11.1, 11.2, 11.3,11.4,11.5, 11.6 and 11.7 of IS 13779 shall apply.

7.7 **Test and Test Conditions: Asper 6.13** of IS 16444

7.8 **Power Factor Range:**

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

9.0 **Load Switch Requirement**- As per clause 7 of IS 16444.

10.0 Smart Meter Connection/Disconnection Mechanism- As per Clause 11 of IS 16444.

11.0 STARTING CURRENT:

The meter should start registering the energy at 0.2% of Ib and unity power factor in all the 3 phases.

12.0 Data Exchange Protocol: The requirements as per IS 15959 (Part 1) shall apply.The data exchange protocol chosen for Smart Meter shall be as per IS 15959 (Part 2) including specific requirements for Smart Meters for the application layer. This application layer protocol which is primarily DLMS/COSEM shall work through the other layers as given in **9 of IS 16444**.

13.0 **Communication Requirement:** The requirement given in 9 of IS 16444 shall apply.

14.0 **Smart Meter Association Requirements:**Clause 4 of IS 15959 PART 2 shall be applicable.

15.0 **Push Services in Smart Meter:**Clause 6 of IS 15959 PART 2 shall be applicable.

16.0 **Advanced Security Profile:** Clause 7 of IS 15959 PART 2 shall be applicable.

17.0 **IP Communication Profile Support:** Clause 8 of IS 15959 PART 2 shall be applicable.

18.0 **Firm Ware Upgrade:**Clause 9 of IS 15959 PART 2 shall be applicable.

19.0 **Parameter List For Smart Meters:**Clause 17 of IS 15959 PART 2 shall be applicable.

Instantaneous parameters shall be as hereunder:

- Real time clock, date and time
- Current (I*R,IY,IB)*
- Voltage(VRN, VYN, VBN)
- Signed power factor,(R-phase , Y-phase,B-phase)
- Three phase power factor, PF
- Frequency – Hz
- Apparent power, kVA
- Signed active power, kW (+ Forward; – Reverse)
- Signed reactive power, kvar (+ Lag; – Lead)
- Number of power — failures
- Cumulative power — OFF duration in min
- Cumulative tamper, billing, programming count
- Billing date
- Cumulative energy, kWh (Import and Export)
- Cumulative energy kvarh-Q1,Q2,Q3, Q4
- Cumulative energy, kVAh (Import and Export)
- Maximum demand, kW (Import and Export)

- Maximum demand, kW (Import and Export) - Date & Time
- Maximum demand, kVA (Import and Export)
- Maximum demand, kVA (Import and Export) Date & Time
- Load Limit function Status
- Load limit value in KW
- Angle between all Phase (A,B and C) voltages

20.0 **Block Load Profile Parameters:** Clause 18 of IS 15959 PART 2 shall be applicable. Parameters shall be as hereunder:

- Real time clock, date and time
- Frequency
- Current (I*R,IY,IB)*
- Voltage (VRN, VYN, VBN)
- Block energy, kWh (Import and Export)
- Block energy, kWh (Net)
- Block energy, kVAh (Import and Export)
- Communication Network Availability during the IP.
- Signal strength of communication network
- Status of Communication
- Average Signal Strength

Above parameters shall be measured and recorded at the end of each 15 min interval for last 60 days.

21.0 **Daily Load Profile Parameters:** Clause 19 of IS 15959 PART 2 shall be applicable. Parameters shall be as hereunder:

- Real time clock, date and time
- Cumulative energy kWh (Import and Export)
- Cumulative energy, kVAh (Import and Export)
- Maximum Demand,Kw
- Maximum Demand,kw- date and time
- Maximum Demand,Kva
- Maximum Demand,kVA- date and time

Above parameters shall be measured and recorded at each midnight i.e. 00:00 hrs for last 60 days.

22.0 **Billing Profile Parameters:** Clause 20 of IS 15959 PART 2 shall be applicable. Parameters shall be as hereunder:

- Billing date
- System power factor for billing period import
- Cumulative energy, kWh (Import and Export)
- Cumulative energy, kWh (Import and Export) for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- Cumulative energy, kVAh (Import and Export) for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- MD, kW (Import and Export)
- MD KW (Import and Export)- Date and Time- for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- MD, kW (Import and Export) for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- MD kVA (Import and Export)- Date and Time- for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- MD, kVA (Import and Export) for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- Billing power ON duration in minutes (During billing period)
- Cumulative energy, kvarh-(Q1,Q2,Q3 and Q4)
- Tamper Count for Billing Period

Table 1

Time Zone	**Time**
TZ1	17.00 to 18.00 Hrs.
TZ2	18.00 to 22.00 Hrs.
TZ3	22.00 to 23.00 Hrs.
TZ4	23.00 to 05.00 Hrs.
TZ5	05.00 to 06.00 Hrs.
TZ6	06.00 to 08.00 Hrs.
TZ7	08.00 to 11.00 Hrs.
TZ8	11.00 to 17.00 Hrs.

The Billing Purpose Parameters Should Be Recorded and Should Be Available in Bill (History) For A Minimum Period of Last 12 Months.

23.0 **Events:** Clause 21 of IS 15959 PART 2 shall be applicable.Parameters shall be as hereunder:

22.1 **Indian Event Reference Table —Voltage Related:**

Occurrence and Restoration of following events:-

- Voltage Missing in any phase (R-Phase, Y-Phase, B-Phase)
- Over Voltage in any Phase (R-Phase, Y-Phase, B-Phase)
- Low Voltage in any Phase (R-Phase, Y-Phase, B-Phase)
- Voltage Unbalance

22.2 Indian Event Reference Table — Current Related:

Occurrence and Restoration of following events:-

- Current reverse in any phase (R-Phase, Y-Phase, B-Phase)
- Current unbalance
- Current bypass
- Over current in any phase

22.3 Indian Event Reference Table — Power Related:

Occurrence and Restoration of following event:-

- Power failure.
- Meter shall detect each occurrence and restoration of power Outage Event off if the phase voltage is absent.
- Smart Meters shall be capable enough to register Instantaneous Reading parameters (Cumulative KWh and KVAh) and Instantaneous Voltage(VRN, VYN, VBN) with every occurrence and restoration of power Outage Event.
- Total number of power On/OFF event to be stored shall be minimum 300 in FIFO basis.

22.4 Indian Event Reference Table —Transaction Related

- Real Time Clock – Date and Time
- Demand Integration Period
- Profile Capture Period
- Single-action Schedule for Billing Dates
- Activity Calendar for Time Zones
- New Firmware Activated
- Load Limit (KW) set
- Enabled Load Limit function
- Disabled Load Limit function

22.5 Indian Event Reference Table — Others:

Occurrence and Restoration of following events:-

- Abnormal external magnetic influence –Occurrence only

- 202 Abnormal external magnetic influence –Restoration only
- Neutral disturbance (HF, d.c. or alternate method)
- Low PF
- Plug in communication module removal –Occurrence
- Overload-Restoration

22.6 Indian Event Reference Table — Non-rollover Events:

Meter cover opening — Occurrence

22.7 Indian Event Reference Table — Control Events:

Load Switch Status-Disconnected

Load Switch Status-connected

22.8 Capture Parameters for Events

- Date and time of event
- Event code
- Current, IR
- Current, IY
- Current, IB
- Voltage, VRN/VRY
- Voltage, VYN
- Voltage, VBN
- Power factor, R-Phase
- Power factor, Y-Phase
- Power factor, B-Phase
- Cumulative energy, kWh

(Import)

- Cumulative energy, kWh

(Export)

- Cumulative tamper count

24.0 **General Purpose Parameters:**As per clause 22 of IS 15959 Part 2. The parameters shall be as hereunder:

23.1 Name Plate Details:

- Meter serial number
- Device ID
- Manufacturer name
- Firmware version for meter

- Meter type
- Category
- Current rating
- Meter year of manufacture

23.2 **Programmable Parameters: Parameters shall be as hereunder:**

- Real time clock – Date and time
- Demand integration period
- Profile capture period
- Single-action schedule for billing dates
- Activity calendar for time zones
- Load Limit (KW)
- Enable/Disable Load Limit Function

25.0 **Real Time Clock(RTC):** As per IS 16444/ IS 15884 The clock day/date setting and synchronization shall only be possible through password/Key code command from one of the following:

- From remote server through suitable communication network.
- Hand Held Unit (HHU) or Meter testing work bench and this shall need password enabling for meter;

(The methodology for the synchronization would be as per requirement of utility)

26.0 **Battery Backup**: Meter shall be supplied with separate battery backup for RTC.

27.0 DISPLAY OF MEASURED VALUE:

Parameters	ON Display	ON BCS
KWH (FORWARD)	7+0	**7+0**
KVAH (FORWARD)	7+0	**7+0**
MAX. DEMAND(KW)	3+2	3+2
MAX. DEMAND**(KVA)**	3+2	3+2
CUMULATIVE MAX. DEMAND	**4+2**	**4+2**

26.1. The measured value(s) shall be displayed on seven segments, seven digit Liquid Crystal Display (LCD) display unit/register with Backlit, having minimum character height of 8 mm.

26.2. The data should be stored in non-volatile memory. The non-volatile memory should retain data for a period of not less than 10 years under un-powered condition. Battery back-up

memory will not be considered as NVM.

26.3. It should be possible to easily identify the displayed parameters through symbols/legend on the meter display itself.

26.4. In case of multiple values presented by a single display, it shall be possible to identify each displayed value/parameter through separate symbol/legend to be made available on the display itself.

26.5. The register shall be able to record and display starting from zero, for a minimum of 1500 hours, the energy corresponding to rated maximum current at reference voltage and unity power factor. The register should not roll over in between this duration.

METER SERIAL NUMBER:

In addition to providing serial number of the meter on the display unit of the meter and display plate, the meter serial number shall also be programmed into meter memory for identification through CMRI/meter reading print out.

28.0 Display Parameters & Type of Display:

PUSHBUTTON MODE DISPLAY PARAMETERS

a. LCD segment check
b. Meter serial number
c. Real time
d. Date] or Date and Time
e. KWH Forward
f. KVAH forward
g. Meter reading count
h. Cumulative power-on hours
i. Current Month Max. Demand (kW).
j. Prev. Month Max. Demand (kW).
k. Cumulative max. demand(kw)
l. Current Month Max. Demand.(KVA) during Peak hours
m. Prev. Month Max. Demand.(KVA) during Peak hours
n. Cumulative Max. demand(KVA)
o. MD reset count
p. All Phases Voltage (P-N)
q. All Phases Line Current
r. Inst. Frequency (Hz)
s. Power factor
t. Inst load KW
u. Inst. Load KVA
v. Cumulative power on hours reading of predefined date and time of the last two consumption months (BP POH).
w. Tamper Data:
1. Present status of tamper:
a) Missing potential with phase identification
b) Current polarity reversal with phase identification
c) Current short & open.
d) Other tampers(magnet. ND)
2. Date and time of last tamper occurrence with tamper identification
3. Date and time of last tamper restoration with tamper identification.
4. Cumulative tamper count of all types of tampers.

AUTO MODE DISLAY PARAMETERS

a) LCD segment check .
b) Meter serial number
c) Real time
d) Date or Date and Time
e) KWH Forward
f) KVAH forward
g) Current month max. demand (kw)
h) Prev. Month Max. Demand (kw).
i) Cumulative Max. demand(kw)
j) Current month max. demand(KVA)
k) Previous month max. demand(KVA)
l) Cumulative max. demand(KVA)
m) Inst. Load KW
n) MD reset count
o) Cumulative tamper count of all types of tampers.
p) Existing tamper, if any.
q) Avg. Power factor
r) Voltage all phase
s) Current all phase

Each parameter shall be on meter display for 10 seconds and the time between two auto cycles shall not be more than 60 seconds subject to 10% tolerance.
Detailed tamper information as per DLMS should, however, be logged in the meter memory and be capable of downloading to the BCS through the CMRI and be available for viewing at the BCS end.

Note : The TOD wise bill point active energy, and maximum demand though not provided on meter-display, should be logged in the meter memory and be capable of downloading to the BCS through the CMRI and be available for viewing at the BCS end.

29.0 25.0Special Requirement For Display:

28.1 The meter shall have indication for unsatisfactory/non-functioning of the following:—
a) Time and calendar
b) Real time clock with battery
c) All display segments
d) Non-volatile memory.

28.2 The meter serial number, consumers name and address, C.T. and P.T. ratio and date with time of taking reading shall invariable be available at base computer software.

28.3 The meter shall be factory programmed for each and every month for minimum 20 years at the time of manufacture and correctness of 20 years calendar. In addition following parameters should also be factory programmed:—

a) Integration period
b) Display sequence

28.4 The meter shall have provision of reading in the absence of power through an external source. An inductive coupling arrangement shall be provided so that it should not be possible to damage the circuit of the meter by applying excess voltage directly in the meter. The meter should be powered up using an external battery pack only in absence of power supply to the meter to enable taking of meter readings through display and optical communication port. The supplier has to supply one no. Power Pack unit with each lot of 100 nos. of meters without any extra cost in case of external source of supply. In case of internal battery back up for reading and data downloading through MRI in absence of power supply, the battery must be able for a backup time of minimum 7 days (168 hrs) as per Clause 39.2 .

28.5 Meter shall invariably be provided with LCD display cycling facility for essential parameters, as envisaged under clause No. 7.0 of the technical specification.

28.6 While installing the meter, it shall be possible to check the correctness of the C.T. & P.T. connections to the meter and their polarity with the help of common meter reading instrument.

28.7 The meter and related instruments, when installed, shall be constructed in a way offering full protection against contact voltage, other hazards resulting from/or related to the operating principle and the utilization of the equipment. In particular if any metal part accessible while covers are in place, then the base shall be fitted with protective Earth terminal identified by the Earthing symbol ⊥ and connected to all accessible metal parts.

28.8 **The Static Trivector Meter shall have memory capacity to store followings parameters**

28.8.1 The static tri vector meter shall measure and retain previous 12 months data (month wise) of the KWH and KVAH reading at 2400 hrs. of the last days of each calendar month, along with monthly consumption in kwh and kvAh for each month including current month consumption. Average power factor and maximum demand with date and time of occurrence of that particular month . These parameters shall also be obtainable through common meter reading instrument whenever required of last 12 months.

28.8.2 The meter shall also have memory capacity to measure & retain tampers evident data of 200 events in compartments as per DLMS (treated occurrence & restoration as separate event). Upto 50 events configured in one compartment which will rollover on FIFO basis(except the non roll over events).

28.8.3 The meter shall record three phase voltage, current, power factor separately with KWh and KVAh energy, at the time of each event (except power ON/OFF.)

28.8.4 Meter shall also store & communicate instantaneous electrical parameters, vector representation as and when meter data downloaded from meter to MRI at BCS end.

28.8.5 The meter shall have sufficient memory capacity to store above parameters with defined duration / frequency / numbers of event with FIFO basis.

28.9 The meter shall be provided with an accurate quartz crystal based real time clock. The maximum drift permissible in the real time clock shall be ±5 minutes per year for class 1.0S Meters.

30.0 Maximum Demand Registration And Resets:

The meter shall continuously monitor and calculate the average maximum demand for each interval of time of 30 minutes and maximum of these shall be stored along with date and time when it occurred. The meter shall automatically store the 30 minute average demand. At the end of every 30 minutes, the new calculated demand should be compared with previous maximum demand and stored whichever of them is higher. The maximum demand for every calendar month along with the date and time when it occurred should be registered.

The maximum demand shall automatically reset at 24.00 Hrs. of the last date of each calendar Month for which minimum 20 calendar years shall be programmed by the manufacturer at his work.

The meter shall be provided with its own real time clock calendar with built in battery backup and time derived from this clock shall be used for maximum demand intervals. The meter shall display the maximum demand reset count.

31.0 LOAD SURVEY CAPABILITY & BILLING POINT REQUIREMENTS:

Measure & retain minimum Load Survey data of past 2 months to store average KW, KVA, PF, 3 phase voltage and current parameters of 30 min integration period. It shall be possible to select either demand or energy view at the BCS end.

The load survey data can be downloaded & presented in the form of bar charts as well as in spread sheets. The BCS shall have the facility to give complete load survey data both in numeric and graphic

form.

32.0 BILLING PARAMETERS

The predefined date and time for registering the billing parameters of KWh, KVAh , KVA and kW MD as well as Tamper Count and Power-on hours readings shall be 24:00 Hrs of the last day of every month . All current billing parameters shall be transferred to billing registers.
The above billing data, TOD register's data, load survey data, tamper information data shall all be retrievable through the meter's communication port through a common meter reading instrument (CMRI) and shall be transferred (downloaded) to a PC with windows based software to get complete details in numerical and/or graphic form. The necessary base computer software (BCS) for this purpose shall be provided by the supplier with complete details.

33.0 SELF DIAGNOSTIC FEATURE:

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

a. Time and date and
b. All display segments as per the requirement under G 19 of IS 14697.
c. Real Time Clock (RTC)
d. Non Volatile Memory (NVM)
If possible, the details of malfunctioning should be recorded in the meter memory.

34.0 TAMPER AND FRAUD PROTECTION

Tamper detection Feature	**Occurrence**			**Restoration**		
	Voltage	**Current**	**Occurrence Time**	**Voltage**	**Current**	**Restoration Time**
Voltage Failure	< 55% Vbasic	Ignored	5Min	> 55% Vbasic	ignored	2Min
Current Open	Ignored	Iph<2% Ib & CT Bypass >15% Ib& No current reversal in any Ph	5Min	Ignored	Iph>2% Ib or CT Bypass <15% Ib	2Min
Current reversal	Vref	Iph> 10% of Ib& Power factor> 0.5 in that phase and current flow in	5Min	Vref	10% of Ib& Power factor> 0.5 in that phase and current flow in forward	2Min

		reverse directio n			directio n	
Voltage unbalanc e	V max-Vmin>30% Vref	Ignored	5Min	V max-Vmin< 30% Vref	ignored	2Min
Current Bypass	Ignored	CT Bypass >20% Ib&Iph> 2% Ib(in all phases) & No current reversa l in any Ph	5Min	Ignored	CT Bypass < 20% Ib or any Iph< 2%Ib	2Min
Current unbalanc e	Ignored	I max-Imin>3 0% Ib	5Min	Ignored	I max-Imin< 30% Ib	2Min
Magnetic logging	Meter shall record at Imax ,**Whenever effected by magnetic field. Ocuurance&resoration within 30 sec**					
Neutral disturba nce	Vph>1.5 Vref	Ignored	20 Sec	Vph<1.5 Vref	Ignored	20 Sec
	For any abnormal neutral disturbance signal, meter either remains immune or in case the meter functionality is getting affected, neutral tamper will be logged with date and time as an even and meter to record energy (V ref, actual current and UPF will be taken for metering					
Top Cover open	Event will be logged incase of power failure also, "Cover open" message will be activated on display along with date and time. Once the meter cover open display appears on screen, no other reading kwh, kvAh, demand etc should be on display . However the reading shall be available on push button mode. Event is not resettable. Once occurred the event will be there permanently on display					
Low Voltage	55% Vref<Vph<7 5% Vref	Ignored	5Min	Vph<55% or Vph>75% Vref	Ignored	2Min
Over Voltage	115% Vref<Vph<1 50% Vref	Ignored	5Min	115% Vref>Vph>1 50% Vref	Ignored	2Min
Over Current in any phase	Ignored	Iph>12 0% In	5Min	Ignored	Iph<12 0% In	2Min
Power Failure event	When all three phases are switched off for 1 minute and more					

a. The meter shall be capable of recording power and remain functional on all prevailing Tampering practice.

In addition to this, meter should log minimum 10 events for meters authenticated transaction i.e time setting, time zones, Integration period change etc.

b. Meter cannot be put in dead zone (non functioning zone) either by high voltage discharge (Spark) upto 35KV& by any external high frequency source. Hidden memory fully secured for outer / internal impact compare actual supply parameters & if functionally meter gets changed/change in parameters, the tamper shall be logged and suitable display on meter LCD shall be given. **35KV Spark test** – The meter (without box) shall be capable to withstand 35KV and should be immune if applied on the terminal, optical port and all sides of meter.

c. **DC Immunity**: The meter shall not saturate on passage of direct current which can cause the meter either to stop recording/record inaccurately. Measurement by meter shall not get influenced by injection of chopped signal/DC signal /DC pulse of low frequency.

d. **Snap Shots** The meter shall record three phase voltage, current, power factor separately with KWh and KVAh energy at the time of each tamper event (except power on off) with the date and time.

e. While connecting 3 phase capacitive bank unit to meter, under balance and unbalanced pure capacitive load meter should not log current reversal and should not increment in active energy (at no-load condition).

f. The meter shall keep working accurately irrespective of the phase sequence of the supply.

g. Mid night snap shot is required for configured energy (Active, Reactive Lag and lead and Apparent) for last 35 days.

h. Provision should be there for indication of existing tamper status in the meter preferably providing additional LED on meter body/LCD annunciator which should glow/display in case of tamper existing

35.0 TAMPER LOGIC:

Properly designed meter tamper logic should be provided. The tamper logic should be capable of discriminating the system abnormalities from source side and load side and it should not log/record tamper due to source side abnormalities.

There shall be minimum five separate compartments for logging of different types of tampers.

Bidder under their offer should explain the logging of various tampers in each compartment.

Once one or more compartments have become full, the last tamper event pertaining to the same compartment will be entered and the earliest (first one) tamper event should disappear. Thus, in this manner each succeeding tamper event will replace the earliest recorded event, compartment wise. Events of one compartment/category should overwrite the events of their own compartment/category only.

Bidders may indicate alternate proposals for the above tamper detection and logging scheme. Tamper

count should increase as per occurrence (not restoration) of tamper events. The total number of tamper counts should also be provided on the meter display as well as at the BCS end.

36.0 TAMPER PERSISTENCE TIME:

The tamper persistence time for logging/registration of an occurrence of a tamper should be 5 minutes +/- 10 seconds. The persistence time for logging of restoration of tamper should not be more than 120 seconds.

37.0 Time Of Day (TOD) Tarrif:

Meter should be able to store apparent and active energies (forward) consumption along with maximum demand in Kw and KVA for at least different 8 time zones.

Meter shall be able to record and store apparent and active energies, consumption along with maximum demand in KVA during specific peak hours described as following time Zone of register in sequence:—

a) 17.00 to 18.00 Hrs.
b) 18.00 to 22.00 Hrs.
c) 22.00 to 23.00 Hrs.

d) 23.00 to 05.00 Hrs.
e) 05.00 to 06.00 Hrs.
f) 06.00 to 08.00 Hrs.
g) 08 Hrs..00 to 11.00 Hrs.
h) 11.00 to 17.00

The starting of display of TOD zones shall be from 17:00 hrs to 18:00 hrs as first slot and last slot as 11:00 hrs to 17:00 hrs.

The meter shall have facility for recording and storing of TOD consumption and maximum demand data on minimum Three Tariff Rates, per day basic.

It should be possible to change the time period for TOD recordings through the portable device or programmable BLOCK installed in the meter itself or manually with proper security at site. The main control for this change shall be available on the computer located at the Metering Office.

38.0 Communication Capability:

The meter shall also have facilities for data transfer locally through CMRI via an optically isolated communication port using serial communication.. It should be possible to configure meter for TOD tariff demand integration period, billing date, real time clock and date etc. through CMRI locally without any extra cost to MVVNL, but the same shall be done by the manufacturer only after taking due approval of MD, MVVNL or his authorized representative. The meters shall have a galvanically isolated optical communication ports as per IEC 1107 so that it can be easily reading instrument for data transfer. The meter shall have additional RJ11 (RS232)/Micro USB (RS232) port along with optical port for reading data through CMRI and AMR modem. Communication ports shall not be affected by any type of infection/unauthenticated signals. The baud rate should not be less than 9600 bps and higher baud rate shall be preferred for down loading the data. The complete data shall be downloaded within 5 minutes from meter to CMRI & from CMRI to BCS.
The bidder shall supply software required for local (CMRI) & remote (AMR) connectivity including required training to use the software free of cost. Both the communications port may work simultaneously**.** Separate communication cords for optical port and RJ11 (RS232)/Micro USB (RS232) port have to be supplied with each meter free of cost duly fitted with meter box with a provision of reading the data without opening the meter box. Also the meter box shall have provision of sealing optical port. RJ11 port should have sealing provision at the meter body. **The bidder shall provide meters as per DLMS compliance i.e. meters with open protocol as per IS: 15959 Category "C" for consumer metering.**

39.0 Software:

Software for reading, down loading data of the meter and TOD programming in the meter,normally resident in the Common Meter Reading Instrument (CMRI), software suitable for MS- DOS 5.0 or higher version.

Windows based Base Computer Software (BCS) for retrieving data from CMRI and downloading instructions from base computer software to CMRI. This BCS should have, amongst other requirements and features and facilities described later in this specification, the facility to convert meter reading data into user definable ASCII file format so that it may be possible for the user to integrate the same with the user's billing data and process the selected data in desired manner.
Necessary software for loading application program via CMRI serial port.The following software shall be made available and installed on CMRI & BCS by the firm whose meters are to interface with CMRI

without any extra charges. Any future up gradation in both the software shall also be provided free of cost.

(f) Software to be resident in CMRI for the purpose of reading and programming the specific make(s) of static meters.

(g) Base computer stations (BCS) software for accepting data for CMRI, processing generating reports and down loading instruction from the BCS to CMRI. The firm will also provide ASCII conversion utility alongwith BCS software for processing of the billing data.

(h) The firm shall install the above software without any extra cost on call from one of the Test Division located in each of the Zones. The purchaser will arrange these software installations in rest of the existing and future Test Divisions for which necessary softcopies with appropriate licences shall be provided by the firm.

(i) It should not be possible to re-program the meter at site (write facility through optical port). The meter programming through optical port shall not be acceptable except time of day (TOD) and real time clock (RTC). Provision for programming of TOD and RTC shall necessarily be provided.

(j) For efficient and speedy recovery of data read through CMRI, view & analysis, a Base Computer Software (BCS) shall have to be supplied having the following features:

(b) The BCS software shall be windows based (windows 98 & all higher version) user friendly. The data transfer shall be highly reliable and fraud proof. Base Computer software shall give all details adequate for analysis and abnormal event data & load surveys parameters. The software shall have the facility to convert all the consolidated information / data of selectable parameters into ASCII format. EDP department of purchaser can generate its own DBF (data base files) to downloaded all the required information into it.

Platform:

The BCS shall be executable on MS WINDOWS 98, WINDOWS 98, WINDOWS-2003 XP, WINDOW XP PROFFESIONAL, VISTA, WINDOWS 2007 or higher updated operating platform or higher operating system. The BCS shall be suitable to run on IBM PC or compatible hardware platform.

(ii) **Meter Data Display:**

The software shall show electrical condition existing at the time of reading the meter in tabular forms as well as graphical format (Phase diagram with phase angle)

All the information about energy, maximum demand and their respective TOD register reading, billing register readings shall be shown in a manner which user can easily understand.

All the load survey data shall be available in numerical as well as graphical format. It shall be possible to view this data daily, weekly, and monthly format. The load survey graph will show values where the cursor is placed for the selected or for all parameter.

All the information about abnormality events shall be accompanied with date and time stamping of respective electrical conditions. This information shall be displayed in the sequence in which it happened in cumulative format as well as summary format.

BCS should display the Date and Time for followings - Meter Reading, MRI taken at site and MRI

dump in the computer. The software shall be capable of preparing CMRI to read the meter information or time setting of the meter.

(iii) Support Display:

There shall be "user friendly" approach for viewing meter data for the reading collected now or for the reading collected in the past. All information about a particular consumer will be sorted out and available at one place so that locating any consumer 's past data is easy. It shall be possible to retrieve/locate data on the basis of either one of the following particulars:

a) Site ‘s ID/Numbers.
b) Meter Sr. No.
c) Date of meter reading. d) Location.

BCS of the bidder should support the supplied meters of it own make

(iv) The Data Transfer:

It shall be possible to transfer data to and fro from CMRI through serial interface.

(v) Configurability ;

It shall be possible to have selective print out of all available data of the meter. Print out shall not include anything and everything available with the BCS. The
software shall support "print wizard" whereby user can decide what to print out.

The use of the software need not revert back to the supplier of the software for modifying the software just to print what he desires.

BCS shall have facility to export data to ASCII or spreadsheet format for integrating with the purchaser's billing system. Here again an "Export wizard" or similar utility shall be available whereby user can select file format, what data to export, the field width selection etc.

(vi) Security:

The BCS shall have multilevel password for data protection and security. The first level shall allow the user to enter the system. The different software features shall be protecting by different passwords. The configurable of passwords shall be user definable. The software installed on one PC shall not be capable on another PC.

(vii) Help ;

The exhaustive online help shall be available with the software so that user can
use all the features of the software by just reading the help contents.

Necessary software for loading application program via CMRI through serial port. Also meter reading data downloading facility directly from meter to laptop with 1 cord per 500 meter shall be provided with desired software.

40.0 SALIENT FEATURES:

The meters shall have the following additional salient features:-

39.1 Meter shall have provision of Phase indicators to show healthiness of individual voltages. In addition to above, phase indicators shall blink in case of connection abnormality persist at meter terminal.

39.2 The meter shall have provision of reading in the absence of power through an external source. An inductive coupling arrangement shall be provided so that it should not be possible to damage the circuit of the meter by applying excess voltage directly in the meter. The meter should be powered up using an external battery pack only in absence of power supply to the meter to enable taking of meter readings through display and optical communication port.

39.3 If any bidder proposes for Internal Battery backup in the meter in case of mains supply failure for meter reading and meter data downloading, no power shall be consumed for this circuit when mains are available to recharge the battery.In case of power failure data downloading for Historical energy, maximum Demand & all the tamper events through CMRI (common meter reading instrument) shall be possible though battery internal /external backup. Rechargeable capacitor back up power shall not be used for display under Power absence condition. To verify that the sample meters are not having capacitor rechargeable battery, the samples will be kept in power off conditions for 7 days (168 hrs.) and then meters will be checked by pressing the push button and the CMRI shall be done."

39.4 The meter should work accurately irrespective of phase sequence of the mains supply only in forward direction.

39.5 The meter preferably shall have scroll lock facility to lock desired parameter from push button displays parameter.

39.6 The meter should remain powered up and functional even when either any two phases or any one phase with neutral is available to the meter.

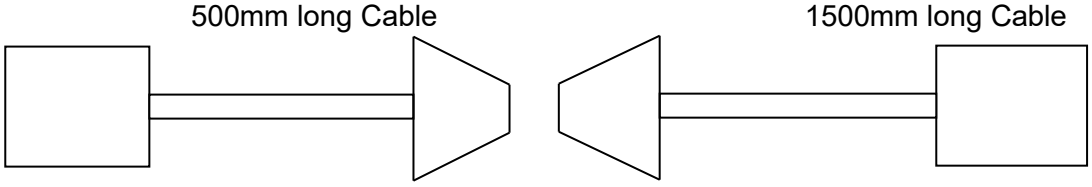
39.7 The meter should continue to record accurately as per prevailing electrical conditions even if the neutral of potential supply gets disconnected.

39.8 The meter shall remain powered up and functional on all prevailing tamper practices.

Interface With MS Dos Based Cmri:

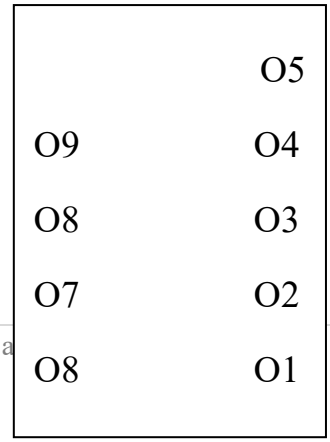
For Physical interface between meter and Common Meter Reading Instruments shall consist of meters optical sensor terminating into a 9 Pin D type male connector with a cable of 500mm + 10mm length with a provision of reading the data without opening the meter box. Also additional RJ11 port at the meter body shall have sealing provision.

Illustration No.1



Optical Port for connecting to Meter 9 pin Male 9 pin female Connection to CMRI

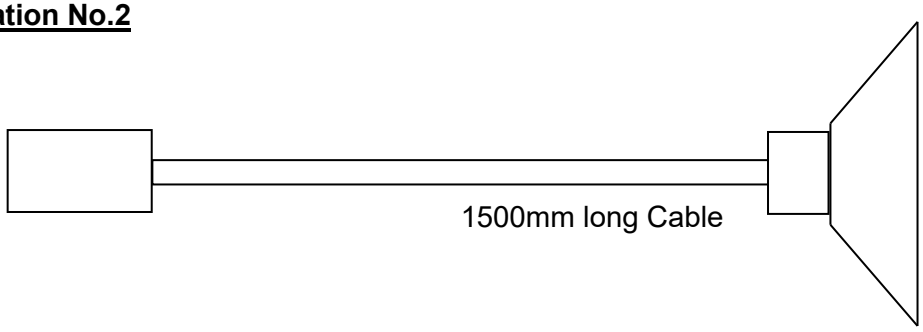
The configuration of 9 Pin D type male connector shall be as given below:



PIN	SIGNAL NAME
01	NC
02	TRANSMIT DATA (TXD)
03	RECEIVE DATA (RXD)
04	NC
05	SIGNAL GROUND (SG)

06	NC
07	NC
08	NC
09	POWER SUPPLY

Illustration No.2



Connection to CMRI 9 Pin Female connector to Base Computer Station (BCS)

41.0 Drawing And Manual:

40.1 The firm is required to submit one copy of drawing and manual with the tender documents and in each packing case of energy meters for use of field offices.

40.2 Maintenance and repair manuals including instructions for testing adjustments and calibration shall be submitted with the contractual documents.

42.0 **MINIMUM TESTING FACILITIES:**

The tenderer should have the necessary minimum testing facilities for carrying out the following tests:

1. AC voltage test
2. Insulation resistance test
3. Test of limits of errors
4. Test of meter constant
5. Test of starting condition
6. Test of no load condition
7. Repeatability of error test
8. Test of power consumption
9. ESD Test at 35 KV
10. Tamper conditions - as per this specification

The manufacturer should have duly calibrated RS meter of Class 0.2 accuracy or better. Manufacturer also should possess fully computerized meter test bench system for carrying out the relevant routine/acceptance tests as well as facility to generate test reports for each and every meter tested.

43.0 Purchaser reserves the right to ask the successful Bidder to carry out complete type testing and anti-tamper feature test on the sample meter from their delivered lot, from any of the below mentioned test laboratories at their own cost, which shall be reimbursed by purchaser on submission of successful type test reports as per IS : 13779 : 1999 (read with latest revision thereof)/CBIP technical report No. 304 with latest revision thereof.

44.0 Inspection And Testing:

43.1 All meters shall be duly tested and sealed by the firm at their premises prior to inspection. Manufacturer seal may be provided on one side of meter. For the other side, the seal with engrave as Utility name may be sent in a pack for provision by utility after completion of test by the utility & after receipt of the meter.

The utility/ purchaser may inspect the meter randomly as per sampling plan for acceptance test as per IS 16444. The meters shall be tested for all functional requirements as part of acceptance test as per IS 16444 . After testing, these sample meters shall be additionally sealed and would be kept in safe lock for verification if needed.

43.2 The manufacturer shall have NABL accredited laboratory to ensure accurate testing calibration as per IS 13779 for acceptance test.

43.3 Each lot of meters offered for supply shall be inspected for routine/ acceptance and anti tamper feature test at manufacturers' works to verify that these are being supplied in accordance with relevant standards/ technical specification and guaranteed technical particulars.

43.4 Inspection of material shall be carried out by the representatives of DISCOM

43.5 While offering a lot for inspection/testing, confirmation to the effect that meter have successfully withstood to routine/ acceptance and anti tamper feature test, (Enclosing test results) alongwith packing list shall be submitted to Superintending Engineer (MM), MVVNL, Lucknow as well as to purchaser.

At the times of inspection and testing the firm shall however submit all routine test results of all meters offered, to the inspection officer.

43.6 All instruments used in inspection and testing should be properly calibrated and sealed once a year. Calibration Certificate when demanded by the inspecting officer shall be provided / produced for verification purposes. In case of any dispute regarding calibration, instruments shall be sealed and signed by the representative of the firm and purchaser and will be sent to test house Government lab/ Government Institution of repute, for calibration at the cost of firm.

43.7 Purchaser reserves the right to get the meters inspected/ tested before dispatch by any Independent Inspecting Agency, at the cost of purchaser.

45.0 **TESTS:**

The type test reports/certificates/records for all type tests specified having been successfully performed on the type of meter offered shall be submitted with the tender.

The bidder shall clearly bring out the deviations from this specification clause by clause whether on account of tests or manufacturing process or features incorporated in the meter. The tender lacking

with above information and without supporting test reports for meter meeting the requirement of tests laid in this specification are likely to be rejected.

46.0 Type Test:

Smart meter shall be type tested for all the type tests as per IS: 16444 (latest version) in a third party independent lab. The number of sampling for testing of meters and criteria for conformity would be as per IS 16444. Necessary copies of test certificates shall be submitted as per agreement with the utility.

45.1 Schedule Of Type Test Shall Be As Follows:

45.1.1 Test of Insulation Properties:

(d) Impulse voltage test

(e) a.c. High voltage test

(f) Insulation resistance test

45.1.2 Test of Accuracy Requirements:

(i) Test on limits of error

(j) Interpretation of test results

(k) Test of meter constant

(l) Test of starting condition

(m) Test of no-load condition

(n) Test of ambient temperature influence

(o) Test of repeatability of error

(p) Test of influence quantities

45.1.3 Test of Electrical Requirement:

(g) Test of power consumption test

(h) Test of influence of supply voltage

(i) Test of influence short-time over currents

(j) Test of influence of self-heating

(k) Test of influence of heating

(l) Test of influence of immunity to earth fault

45.1.4 Test for Electromagnetic Compatibility:

(f) Radio interference measurement

(g) Fast transient burst test

(h) Test of immunity to electrostatic discharges

(i) Test of immunity to electromagnetic HF field

(j) Surge Immunity Test

(as per Clause 7.2.6 of **IEC62052**-11)

45.1.5 Test for Climatic Influences

(d) Dry heat test

(e) Cold test

(f) Damp heat cyclic test

45.1.6Test for Mechanical Requirement

(f) Vibration test Shock test

(g) Spring hammer test

(h) Protection against penetration of

(i) dust and water

(j) Test of resistance to heat and fire

NOTE — Following tests shall be carried out to assess for smart meter functional condition and functionality of communication module after the 'Type test and acceptance test' for metrology is carried out but before 'Test of resistance to heat and fire':

a) Accuracy of the meter at pre-defined points [5 percent *I*b,*I*b and *I*max] UPF.

b) Access and Data Read Test

c) Remote Disconnect/Connect

Manufacturer shall demonstrate the functionality of communication module by data read test, that is readingkWh energy register through the communication module.

47.0 Influence Of High Magnatic Field Asper CBIP Technical Report No. 88 (Revised June 2000 or Latest Revision) Read With 3rd Amendment/Errata Feb. 2002

Meter Shall be provided with appropriate magnetic shielding so that any external magnetic field (A.C. electromagnet or D.C. magnet) as per the values specified in CBIP report no. 304 (amended), applied on meter would not affect the proper functioning of meter. Also when magnetic field such as 0.5 Tesla is applied on the meter (which is above the immunity level as defined in CBIP report), it shall record at I max. at UPF.

Influence of Spurious signal : The meter should record accurately in case of DC or spurious signal through neutral and meter should log such condition with date and time. If influenced.

Note: Any other type test if included in IS/IEC/CBIP standard (latest revision) or test as per revised limits have to be done on PROTO-TYPE sample meter.

48.0 The firm shall supply the meter as per specification/drawing as type tested. If any change in the design/parameters is being made, then the meter shall have to be type tested again at the cost of the firm.

49.0 Routine Test:

All the meters offered for supply shall be tested by the manufacturers at their works so as to conform that these are being manufactured in accordance with the technical specification/ISS. A copy of these routine test results shall be enclosed along with the packing list at the time of offering the material for inspection. The Factory Acceptance and Routine tests shall be carried out as per IS 16444. Apart from above test, meter shall be also be tested for all functional requirement through communication as part of acceptance test.

50.0 Acceptance Tests:

As per IS 16444.

51.0 **Surge Test**: The offered should be capable to withstand surge immunity test as per IEC 62052-11 2003 and amendments thereof. Bidder shall have to submit type test report along with offer for this test also.

52.0 Number of Samples and Criteria for Conformity:

Type tests shall be applied to three test specimens. In the event of one specimen failing to comply in any respect, further three specimens shall be taken, all of which shall comply with the requirement of standards.Additional one sample for test for data exchange protocol shall be submitted.

The requirement given in **12** of IS 13779 shall apply

NOTE — Smart meter is to be submitted along with communication module in its place as integral part of the meter.

53.0 Test for Data Exchange Protocol

This test shall be carried out on optical port as per 10.5 of IS 16444.

The test shall be performed on a separate sample.

54.0 Tests for Smart Meter Communicability: As per 10.6 of IS 16444.

55.0 Smart Meter Functional Requirements: As per Clause 11 of IS 16444

56.0 Sample Meter :

Three no sample meter of 3 PHASE, 4 WIRE A.C. STATIC Smart Meter (10-60 Amps) along with type test report must be submitted with the offer. Sample meters of the firms meeting pre-qualifying condition of the tender, shall be tested at any of the Government Lab, as per technical specification and relevant IEC/IS. However right to have meter tested at any Test lab of DISCOM/UPPCL is reserved with purchaser. Date of testing will be informed to all bidders. Engineer of the bidder shall come with BCS and CMRI so that tamper information with date & time, load survey and meter readings could be downloaded by CMRI and printout could be taken to verify the internal features also. Part-II will be opened for only those bidders whose sample meters will pass in testing.

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7.3 Technical Specifications For 3 PHASE, 4 WIRE A.C. STATIC Dual Register Smart Meter (10-60 Amps) DIRECT CONNECTED CLASS 1.0 With Bi Directional Communication Facility Suitable For Advanced Metering Infrastructure (AMI).

1.0 Scope:

This specification covers the design, manufacture, assembly, inspection, testing at manufacturers works before dispatch, supply and delivery at site/FOR destination anywhere in " state" of Class 1.0 accuracy static whole current electronic smart meter of current range 10-60 Amps with bidirectional communication facility for tariff purpose along with other associated equipment as per requirement given in this specification.The meter shall be suitable for Advanced Metering Infrastructure (AMI). Meter shall have provision for pluggable and interchangeable NIC (RF Mesh/ NBIoT/5G-4G-2G) i.e as per field based requirement NIC of either type can be used without changing the meter. The meter shall communicate to DCU based on RF mesh network and DCU with HES on WAN through NBIoT communication technology with fallback arrangement to available communication technology in sequence of 5G-4G-2G mentioned in IS16444 and Functional Requirements of AMI in India and as per the requirement of the utility.

2.0 Standard:

The meters with accuracy class–0.5S are required measurement of Active Energy and shall conform to the latest edition of following standards Unless otherwise specified elsewhere in this specification, the performance and testing of the meters shall conform to the following standards latest amendments thereof:—

IS 13779/ 1999 with latest revision thereof	:	Specification of AC Static Watt hour meters, class 1.0 & 2.0.
IS : 9000 with latest revision thereof	:	Basic Environmental Testing Procedures for Electronic & Electrical items.
IS 12346 (1999) with latest revision thereof	:	Specification for testing procedure for electrical and electronic items.
IS 11000 (1984) with latest revision thereof	:	Fire hazard testing
IEC 62052-11 with latest revision thereof	:	Electricity metering equipment (AC) – General requirements, tests and test conditions, Metering equipment

IEC 62053-21: with latest revision thereof	:	A.C. Static Watt hour meter for active energy Class 1.0 and 2.0
IEC 60068	:	Environmental testing
IEC 61036-1996	:	Specification for AC static Watt-hour Meters, Class 1 & 2.
CBIP Technical Report no. 111	:	Specification for Common Meter Reading Instrument.
CBIP 304: read with latest revision thereof	:	Standardization of AC Static Electrical Energy Meters, publication no. 304
IS: 14772/2000:	:	General requirement for enclosures for accessories for household and similar fixed electrical installation specification.
IS: 15707(2006):	:	Testing evaluation installation and maintenance of AC electricity meter code of practice.
IS 15959 (Part 1):2011 read with latest revision thereof	:	Data exchange for electricity meter reading, tariff and load control - Indian Companion Standard
IS 15959(Part 2):2016 read with latest revision thereof	:	Data Exchange for Electricity Meter Reading, Tariff and Load Control — Companion Specification
IS 16444 with latest revision thereof	:	AC Static Direct Connected Watthour Smart Meter class 1 and 2
CEA Regulation (2006) with latest revision thereof	:	Installation and Operation of meters Dtd: 17/03/2006
CEA Guidelines regarding Smart Metering	:	Functional Requirements of Advance Metering Infrastructure AMI in India
	:	Guidelines For Comminication System Of Smart Meters Plc ,Rf, Cellular Network (3g/4g)

Meter matching with requirements of other national or international standards which ensure equal or better performance than the standards mentioned above shall also be considered. When the equipment offered by the tenderer conforms to standards other than those specified above, salient points of difference between standards adopted and the standards specified in this specification shall be clearly brought out in the relevant schedule.

3.0 Basic Features:

The Dual Register Smart Meter would have the following minimum basic features/services-

- Dual register measurement
- Measurement of electrical energy parameters,
- Bidirectional Communication,
- Tamper event detection, recording and reporting,
- Power event alarms such as loss of supply, low/ high voltage,
- Remote firmware upgrade from HES,
- Remote Connect/Disconnect from HES,
- Net metering features,
- On demand reading from HES,
- Scheduled Meter Reading From HES,
- All programming requests from HES,
- Smart meter association requirement,
- Push services,
- Advanced security profile,
- Communication profile,
- Parameter list for smart meters,

4.0 Communication:

The meter shall communicate to DCU based on RF mesh network and DCU with HES on WAN through NBIoT communication technology with fallback arrangement to available communication technology in sequence of 5G-4G-2G mentioned in IS16444 and Functional Requirements of AMI in India and as per the requirement of the utility.. Meter shall have provision for pluggable and interchangeable NIC (RF Mesh/ NBIoT/5G-4G-2G)i.e as per field based requirement NIC of either type can be used without changing the meter.The plug-in module shall be field swappable with suitable integrated communication module as agreed between buyer and the seller. This module should be able to connect NAN or WAN (as per the plugged module RF Mesh/ NBIoT/5G-4G-2G) for two-way communication. The meter shall log communication module removal /non responsive event with snapshot.

5.0 Climatic Conditions:

The meters to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.Meters shall be capable of maintaining required accuracy under hot, tropical and dusty climate.

a)	Maximum ambient air temperature in shade.	50 Deg. C
b)	Minimum ambient temperature	(-) 5 Deg. C
c)	Maximum relative humidity	95%
d)	Minimum relative humidity	10%
e)	Height above mean sea level	Up to 1000 meters.
f)	Dust storms likely to occur	March to July.
g)	Average number of thunder storm days per annum	50

h)	Average number of tropical monsoon(conditions)	4 months
i)	Average annual rain fall	10 cms to 100 cms.
k)	Seismic level(Horizontal accn)	0.30g
l)	Isoceraunic level (days per year)	40
m)	Average No. of rainy days per annum	60
n)	Maximum Annual Rainfall	750mm
o)	Rainy Months	June to Oct.
p)	Altitude above MSL not exceeding	300 meters
q)	Wind Pressure	126 kg/sq m

The temperature range and relative humidity for performance of meters shall be as per relevant standards.

57.0 Current And Voltage Rating:

Rated voltage (Vref)	3 x 240 V - Phase to Neutral (3 phase 4 wire system) 3 x 415 V - Phase to Phase
Rated current (Ib) (connected through	Basic current 10A (Ib), Maximum current-60 Amps (Imax.)

58.0 Metering:

58.1 Metering Requirement:

Metering and metrology requirement shall be according to IS 13779.

58.1.1 Classification:

The classification as per **4** of IS 13779 shall apply.

58.1.2 Ratings:

58.1.2.1 **Standard reference voltage:**As per **5.1** of IS 13779 and shall be as following:

Meters for	**Standard Exceptional Reference Voltage Values (V)**	**Exceptional Values (V)**
Connection through voltage transformer	240(415)	250(433)

58.1.2.2 **Standard Basic Currents:** As per **5.2** of IS 13779 the basic currents shall be 10 A for 3 phase 4 wires Smart Energy Meter **.**

58.1.2.3 **Maximum current:** As per **5.3** of IS 13779 the rated maximum current for the meter shall be 60 Amps (600 % Ib) at which the meter purports to meet the accuracy requirement.

58.1.2.4 **Standard reference frequency:** As per **5.4** of IS 13779 Standard value for reference frequency is 50 Hz.

58.2 **General Constructional Requirements:** The requirements given in **6.1** to **6.4** of IS 13779 shall apply. The communication modules shall be plug in type as mentioned in **1.2 of IS 16444**. The plug-in communication modules shall be properly secured on the smart meter, both physically and electrically, so as to avoid any possible tampering with adequate provision for sealing.For Terminals-Terminal Block(s) — Protective Earth Terminal the requirements given in **6.4** of IS 13779 shall apply.For Terminal Cover the requirements given in **6.5, 6.5.1, 6.5.2** and **6.7** of IS 13779 shall apply.

58.2.1 Meter shall be designed and constructed in such a way as to avoid introducing any danger in use and under normal conditions so as to ensure specially the following:—

11. Personnel safety against electric shock
12. Personnel safety against effects of excessive temperature.
13. Protection against penetration of solid objects, dust and water.
14. Protection against spread of fire.
15. Detection against fraud or pilferage.

There should not be any screws in the meter body through which meter can be opened and tampered without breaking the seal.

58.2.2 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.

58.2.3 The meters shall be designed with application specific integrated circuit and shall be manufactured using SMT (Surface Mount Technology) components. Power supply and voltage divider circuits may be of PTH technology.

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

58.2.5 The meter shall have an operation indication device such as a blinking LED. The operation indicator shall be visible from the front window and capable of being monitored conveniently with suitable testing equipment.

58.2.6 The meter shall conform to the degree of protection IP 51 of IS:12063/IEC:529 for protection against ingress of dust, moisture and vermin.

58.2.7 The meter shall be supplied with a transparent extended terminal block cover (ETBC) with proper sealing arrangement.

58.2.8 The meter shall have seamless ultrasonically welded insulated body, along with unidirectional screws and wall mounted projected type to be fitted with the help of screws.

58.2.9 The meter-base, meter cover, terminal block and ETBC shall be made of unbreakable, high grade, fire resistant, reinforced, non-flammable, polycarbonate or equivalent high grade and good quality engineering plastic.

58.2.10 **Out Put Device:**

The requirements given in 6.11 of IS 13779 shall apply.

The meter shall have a test output accessible from the front and be capable of being monitored with suitable testing equipment. The operation indicator, if fitted, must be visible from the front. Test output device shall be provided in the form of LED output device. The relation between test output and the indication on display shall comply with the marking on the name plate (imp per kWh)

58.2.11 **Clearance and Creepage Distances:** The requirements given in **6.6** of IS 13779 shall apply.

58.2.12 **Resistance to Heat and Fire:** The requirements given in 6.8 and 12.4 of IS 13779 shall apply.

58.2.13 **Mechanical Requirements:** The requirements for mechanical shall be as per **12.3** of IS 13779 and the requirements for protection against penetration of dust and water shall be as per **6.9** and **12.5** of IS 13779 shall apply.

58.2.14 **Display of Values:** The information shall be shown with an electronic display. The requirements given in 6.10 of IS 13779 shall apply.The non-volatile memory shall support retention period of 10 years.

58.2.15 Connection Diagram:

The connection diagram of the meter shall be clearly shown on inside portion of the terminal cover. The meter terminals shall also be marked and this marking should appear in the above diagram.

58.2.16 **Sealing Of Meter:**

Meter cover should be physically joined by ultra sonic welding on both sides in such a way that meter cover cannot be opened without breaking and shall be physically evident as well as it should be protected thorough cover open switch. It shall be displayed and as well as recorded in MRI. Reliable sealing arrangement should be provided to make the meter tamper evidence and avoid fiddling or tampering by unauthorized persons. For this, at least two (2) Nos. seals on meter body, one (1) No. seal on meter terminal cover and one (1) No. seal on communication port and scroll push button shall be provided. All the seals should be provided on front side only. Rear side sealing arrangement will not be preferred. The suppliers in their offer should explain the sealing arrangement.

58.2.17 **Marking of Smart Meter:**

7.2.17.1 The requirements given in **7** of IS 13779 shall apply. The following additional information shall also be provided as applicable in the name plate:

a) Communication technology for WAN or NAN (with carrier frequency).

b) Communication technology if IHD is supported (with carrier frequency).

c) Symbol of Load Switch.

Every meter shall be provided with a name-plate which shall be clearly marked/embossed as per clause-7 of IS:13779/1999 and . IS:15959. The name plate shall have following markings which shall be indelible, distinct and readable from outside the meter:—

(a) Purchase name, Purchase order No. and date with inscriptions or "PROPERTY OF MVVNL".
(b) Manufacturers name, Trade mark and place of manufacturer. (c) Designed of type.
(d) Nature of current and no. of phases and no. of wires for which meter is suitable for.
(e) The manufacturer's serial no., year of manufactures and warrantee period.
(f) Reference voltage
(g) Reference current
(h) Meter constant (if any) (i) Class of accuracy
(j) Reference temperature
(k) Transformation ratios of instrument transformers (s) of which account is taken for meter constant.

(l) Bar

Bar code as per 128 C format shall be provided on the plate inside meter
Meter serial number to be written in

17.2.17.2 The use of Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the license for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

58.2.18 The terminal block, the ETBC and the meter case shall ensure reasonable safety against the spread of fire. They should not be ignited by thermic overload of live parts in contact with them.

58.2.19 The terminal block shall be of high grade non-hygroscopic, fire retardant, low tracking, fire resistant, reinforced poly-carbonate (not Bakelite) or equivalent high grade engineering plastic which should form an extension of the meter case and have terminal holes and shall be of sufficient size to accommodate the insulation of the conductors, meeting the requirement of IS 13779:1993/CBIP technical report- 304

58.2.20 The terminals shall have suitable construction with barriers and cover to provide firm and safe connection of current and voltage leads of stranded copper conductors or copper reducer type terminal ends (thimbles). The terminal cover shall enclose the actual terminals, the conductor fixing screws, the external conductor and their insulation.

58.2.21 The manner of fixing the conductors to the terminal block shall ensure adequate and durable contact such that there is no risk of loosening or undue heating.

Screw connections transmitting contact force and screw fixing which may be loosened and tightened several times during the life of the meter shall be such that the risk of corrosion resulting from contact with any other metal part is minimized. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material. The internal diameter of the terminal holes shall be 8.5 mm minimum , depth of terminal hole shall be 25 mm.The clearance and creepage

distance shall conform to relevant clause of IS 13779:1993/CBIP technical report no.-304.

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

58.2.23 The potential link shall not be provided out side on meter terminal block.

7.5 **Electrical Requirements:**

9.3.1 **Power Consumption:** The measurement of power consumption in the voltage and current circuits shall be determined as described in the followings.

7.3.1.1 Voltage circuits: The active and apparent power consumptions of a direct-connected composite Smart Meter for each circuit at reference voltage, reference temperature, and reference frequency shall not exceed 5.0 W and 15 VA during the idle mode of communication module. This applies to either one NAN or one WAN module present in the Smart Meter. If a separate module for servicing to IHD is present, the above figures shall not exceed 6W and 18VA during the idle mode of communication module. The additional power requirement during data transmission shall not exceed 7W per communication module. In the case of plug in communication modules, the Smart Meter shall be capable of sourcing 7W for powering the plug in communication module during data transmission.
7.3.1.2 Current circuit: The apparent power taken by each current circuit of a direct-connected smart meter at maximum current, reference frequency, and reference temperature shall not exceed a value in VA equivalent to 0.08 percent of *V*ref in volts multiplied by 100 percent of *I*max in amperes (for example 230 V and 60 A gives 11 VA; 230 V and 100 A gives 18.4 VA).

9.3.2 **Influence of Supply Voltage:** The requirements given in **9.2.1** and **9.2.2** of IS 13779 shall apply.

Variation In Power Supply:

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

Specified operating range	0.8 to 1.1 V ref.
Limit range of operation	0.6 to 1.2 V ref.

9.3.3 **FREQUENCY VARIATION:**

The standard reference frequency for performance of the meter shall be 50 Hz with tolerance +/-5% of rated frequency as CBIP report no. 304.

9.3.4 **Influence of Short —Time Over currents:**The requirements given in **9.2.3** of IS 13779 shall apply.

9.3.5 **Influence of Self-Heating:**The requirements given in **9.3** of IS 13779 shall apply.

9.3.6 **Influence of Heating:**The requirements given in **9.4** of IS 13779 shall apply.

9.3.7 **Insulation Requirements:**The requirements given in **9.5** of IS 13779 shall apply.

9.3.8 **Immunity to Earth Fault:**The requirements given in **9.6** of IS 13779 shall apply.

7.4 Electromagnetic Compatibility: The requirements given in **10** of IS 13779 shall apply.

7.5 Accuracy Requirements: Class of accuracy of meter shall be 1.0 S and shall conform to the requirements given in 11, 11.1, 11.2, 11.3,11.4,11.5, 11.6 and 11.7 of IS 13779 shall apply.

7.9 **Test and Test Conditions: Asper 6.13** of IS 16444

7.10 **Power Factor Range:**

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

59.0 **Load Switch Requirement**- As per clause 7 of IS 16444.

60.0 Smart Meter Connection/Disconnection Mechanism- As per Clause 11 of IS 16444.

61.0 STARTING CURRENT:

The meter should start registering the energy at 0.2% of Ib and unity power factor in all the 3 phases.

62.0 Data Exchange Protocol: The requirements as per IS 15959 (Part 1) shall apply.The data exchange protocol chosen for Smart Meter shall be as per IS 15959 (Part 2) including specific requirements for Smart Meters for the application layer. This application layer protocol which is primarily DLMS/COSEM shall work through the other layers as given in **9 of IS 16444**.

63.0 **Communication Requirement:** The requirement given in 9 of IS 16444 shall apply.

64.0 **Smart Meter Association Requirements:**Clause 4 of IS 15959 PART 2 shall be applicable.

65.0 **Push Services in Smart Meter:**Clause 6 of IS 15959 PART 2 shall be applicable.

66.0 **Advanced Security Profile:** Clause 7 of IS 15959 PART 2 shall be applicable.

67.0 **IP Communication Profile Support:** Clause 8 of IS 15959 PART 2 shall be applicable.

68.0 **Firm Ware Upgrade:**Clause 9 of IS 15959 PART 2 shall be applicable.

69.0 **Parameter List For Smart Meters:**Clause 17 of IS 15959 PART 2 shall be applicable.

Instantaneous parameters shall be as hereunder:

- Real time clock, date and time
- Current (I*R,IY,IB)*
- Voltage(VRN, VYN, VBN)
- Signed power factor,(R-phase , Y-phase,B-phase)
- Three phase power factor, PF
- Frequency – Hz
- Apparent power, kVA
- Signed active power, kW (+ Forward; – Reverse)
- Signed reactive power, kvar (+ Lag; – Lead)
- Number of power — failures
- Cumulative power — OFF duration in min
- Cumulative tamper, billing, programming count
- Billing date
- Cumulative energy, kWh (Import and Export)
- Cumulative energy kvarh-Q1,Q2,Q3, Q4
- Cumulative energy, kVAh (Import and Export)

- Maximum demand, kW (Import and Export)
- Maximum demand, kW (Import and Export) - Date & Time
- Maximum demand, kVA (Import and Export)
- Maximum demand, kVA (Import and Export) Date & Time
- Load Limit function Status
- Load limit value in KW
- Angle between all Phase (A,B and C) voltages

70.0 **Block Load Profile Parameters for Dual register:** Clause 18 of IS 15959 PART 2 shall be applicable. Parameters shall be as hereunder:

- Real time clock, date and time
- Frequency
- Current (I*R,IY,IB)*
- Voltage (VRN, VYN, VBN)
- Block energy, kWh (Import and Export)
- Block energy, kWh (Net)
- Block energy, kVAh (Import and Export)
- Communication Network Availability during the IP.
- Signal strength of communication network
- Status of Communication
- Average Signal Strength

Above parameters shall be measured and recorded at the end of each 15 min interval for last 60 days.

71.0 **Daily Load Profile Parameters for Dual register:** Clause 19 of IS 15959 PART 2 shall be applicable. Parameters shall be as hereunder:

- Real time clock, date and time
- Cumulative energy kWh (Import and Export)
- Cumulative energy, kVAh (Import and Export)
- Maximum Demand,Kw
- Maximum Demand,kw- date and time
- Maximum Demand,Kva
- Maximum Demand,kVA- date and time

Above parameters shall be measured and recorded at each midnight i.e. 00:00 hrs for last 60 days.

72.0 **Billing Profile Parameters for Dual register:** Clause 20 of IS 15959 PART 2 shall be applicable. Parameters shall be as hereunder:

- Billing date
- System power factor for billing period import
- Cumulative energy, kWh (Import and Export)
- Cumulative energy, kWh (Import and Export) for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- Cumulative energy, kVAh (Import and Export) for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- MD, kW (Import and Export)
- MD KW (Import and Export)- Date and Time- for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- MD, kW (Import and Export) for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- MD kVA (Import and Export)- Date and Time- for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- MD, kVA (Import and Export) for all Time Zone(TZ1, TZ2, TZ3, TZ4, TZ5, TZ6, TZ7, TZ8) as per table 1
- Billing power ON duration in minutes (During billing period)
- Cumulative energy, kvarh-(Q1,Q2,Q3 and Q4)
- Tamper Count for Billing Period

Table 1

Time Zone	**Time**
TZ1	17.00 to 18.00 Hrs.
TZ2	18.00 to 22.00 Hrs.
TZ3	22.00 to 23.00 Hrs.
TZ4	23.00 to 05.00 Hrs.
TZ5	05.00 to 06.00 Hrs.
TZ6	06.00 to 08.00 Hrs.
TZ7	08.00 to 11.00 Hrs.
TZ8	11.00 to 17.00 Hrs.

The Billing Purpose Parameters Should Be Recorded and Should Be Available in Bill (History) For A Minimum Period of Last 12 Months.

73.0 **Events:** Clause 21 of IS 15959 PART 2 shall be applicable.Parameters shall be as hereunder:

23.3 **Indian Event Reference Table —Voltage Related:**

Occurrence and Restoration of following events:-

- Voltage Missing in any phase (R-Phase, Y-Phase, B-Phase)
- Over Voltage in any Phase (R-Phase, Y-Phase, B-Phase)
- Low Voltage in any Phase (R-Phase, Y-Phase, B-Phase)
- Voltage Unbalance

23.4 Indian Event Reference Table — Current Related:

Occurrence and Restoration of following events:-

- Current reverse in any phase (R-Phase, Y-Phase, B-Phase)
- Current unbalance
- Current bypass
- Over current in any phase

23.5 Indian Event Reference Table — Power Related:

Occurrence and Restoration of following event:-

- Power failure.
- Meter shall detect each occurrence and restoration of power Outage Event off if the phase voltage is absent.
- Smart Meters shall be capable enough to register Instantaneous Reading parameters (Cumulative KWh and KVAh) and Instantaneous Voltage(VRN, VYN, VBN) with every occurrence and restoration of power Outage Event.
- Total number of power On/OFF event to be stored shall be minimum 300 in FIFO basis.

23.6 Indian Event Reference Table —Transaction Related

- Real Time Clock – Date and Time
- Demand Integration Period
- Profile Capture Period
- Single-action Schedule for Billing Dates
- Activity Calendar for Time Zones
- New Firmware Activated
- Load Limit (KW) set
- Enabled Load Limit function
- Disabled Load Limit function

23.7 Indian Event Reference Table — Others:

Occurrence and Restoration of following events:-

- Abnormal external magnetic influence –Occurrence only
- 202 Abnormal external magnetic influence –Restoration only
- Neutral disturbance (HF, d.c. or alternate method)
- Low PF
- Plug in communication module removal –Occurrence
- Overload-Restoration

23.8 Indian Event Reference Table — Non-rollover Events:

Meter cover opening — Occurrence

23.9 Indian Event Reference Table — Control Events:

Load Switch Status-Disconnected

Load Switch Status-connected

23.10 Capture Parameters for Events

- Date and time of event
- Event code
- Current, IR
- Current, IY
- Current, IB
- Voltage, VRN/VRY
- Voltage, VYN
- Voltage, VBN
- Power factor, R-Phase
- Power factor, Y-Phase
- Power factor, B-Phase
- Cumulative energy, kWh

(Import)

- Cumulative energy, kWh

(Export)

- Cumulative tamper count

74.0 **General Purpose Parameters:**As per clause 22 of IS 15959 Part 2. The parameters shall be as hereunder:

24.1 Name Plate Details:

- Meter serial number
- Device ID
- Manufacturer name

- Firmware version for meter
- Meter type
- Category
- Current rating
- Meter year of manufacture

24.2 **Programmable Parameters: Parameters shall be as hereunder:**

- Real time clock – Date and time
- Demand integration period
- Profile capture period
- Single-action schedule for billing dates
- Activity calendar for time zones
- Load Limit (KW)
- Enable/Disable Load Limit Function

75.0 **Real Time Clock(RTC):** As per IS 16444/ IS 15884 The clock day/date setting and synchronization shall only be possible through password/Key code command from one of the following:

- From remote server through suitable communication network.
- Hand Held Unit (HHU) or Meter testing work bench and this shall need password enabling for meter;

(The methodology for the synchronization would be as per requirement of utility)

76.0 **Battery Backup**: Meter shall be supplied with separate battery backup for RTC.

77.0 DISPLAY OF MEASURED VALUE:

Parameters	ON Display	ON BCS
KWH (FORWARD)	7+0	**7+0**
KVAH (FORWARD)	7+0	**7+0**
MAX. DEMAND(KW)	3+2	3+2
MAX. DEMAND**(KVA)**	3+2	3+2
CUMULATIVE MAX. DEMAND	**4+2**	**4+2**

26.1. The measured value(s) shall be displayed on seven segments, seven digit Liquid Crystal Display (LCD) display unit/register with Backlit, having minimum character height of 8 mm.

26.2. The data should be stored in non-volatile memory. The non-volatile memory should retain data for a period of not less than 10 years under un-powered condition. Battery back-up memory will not be considered as NVM.

26.3. It should be possible to easily identify the displayed parameters through symbols/legend on the meter display itself.

26.4. In case of multiple values presented by a single display, it shall be possible to identify each displayed value/parameter through separate symbol/legend to be made available on the display itself.

26.5. The register shall be able to record and display starting from zero, for a minimum of 1500 hours, the energy corresponding to rated maximum current at reference voltage and unity power factor. The register should not roll over in between this duration.

METER SERIAL NUMBER:

In addition to providing serial number of the meter on the display unit of the meter and display plate, the meter serial number shall also be programmed into meter memory for identification through CMRI/meter reading print out.

78.0 Display Parameters & Type of Display:

PUSHBUTTON MODE DISPLAY PARAMETERS

x. LCD segment check
y. Meter serial number
z. Real time
aa. Date } or Date and Time
bb. Grid KWH Forward
cc. Grid KVAH forward
dd. DG KWH Forward
ee. DG KVAH forward
ff. Meter reading count
gg. Cumulative power-on hours
hh. Grid Current Month Max. Demand (kW).
ii. Grid Prev. Month Max. Demand (kW).
jj. Grid Cumulative max. demand(kw)
kk. DG Current Month Max. Demand (kW).
ll. DG Prev. Month Max. Demand (kW).
mm. DG Cumulative max. demand(kw)
nn. Grid Current Month Max. Demand.(KVA) during Peak hours
oo. Grid Prev. Month Max. Demand.(KVA) during Peak hours
pp. Grid Cumulative Max. demand(KVA)
qq. DG Current Month Max. Demand.(KVA) during Peak hours
rr. DG Prev. Month Max. Demand.(KVA) during Peak hours
ss. DG Cumulative Max. demand(KVA)
tt. MD reset count
uu. All Phases Voltage (P-N)
vv. All Phases Line Current
ww. Inst. Frequency (Hz)
xx. Power factor
yy. Inst load KW
zz. Inst. Load KVA
aaa. Cumulative power on hours reading of predefined date and time of the last two consumption months (BP POH).

bbb. Tamper Data:
5. Present status of tamper:
a) Missing potential with phase identification
b) Current polarity reversal with phase identification
c) Current short & open.
d) Other tampers(magnet. ND)
6. Date and time of last tamper occurrence with tamper identification
7. Date and time of last tamper restoration with tamper identification.
8. Cumulative tamper count of all types of tampers.

AUTO MODE DISLAY PARAMETERS

t) LCD segment check .
u) Meter serial number
v) Real time
w) Date } or Date and Time
x) Grid KWH Forward
y) Grid KVAH forward
z) DG KWH Forward
aa) DG KVAH forward
bb) Grid Current Month Max. Demand (kW).
cc) Grid Prev. Month Max. Demand (kW).
dd) Grid Cumulative max. demand(kw)
ee) DG Current Month Max. Demand (kW).
ff) DG Prev. Month Max. Demand (kW).
gg) DG Cumulative max. demand(kw)
hh) Grid Current Month Max. Demand.(KVA)
ii) Grid Prev. Month Max. Demand.(KVA)
jj) Grid Cumulative Max. demand(KVA)
kk) DG Current Month Max. Demand.(KVA)
ll) DG Prev. Month Max. Demand.(KVA)
mm) DG Cumulative Max. demand(KVA)
nn) Inst. Load KW
oo) MD reset count
pp) Cumulative tamper count of all types of tampers.
qq) Existing tamper, if any.
rr) Avg. Power factor
ss) Voltage all phase
tt) Current all phase

Each parameter shall be on meter display for 10 seconds and the time between two auto cycles shall not be more than 60 seconds subject to 10% tolerance.
Detailed tamper information as per DLMS should, however, be logged in the meter memory and be capable of downloading to the BCS through the CMRI and be available for viewing at the BCS end.

Note : The TOD wise bill point active energy, and maximum demand though not provided on meter-display, should be logged in the meter memory and be capable of downloading to the BCS through the CMRI and be available for viewing at the BCS end.

79.0 25.0Special Requirement For Display:

28.10 The meter shall have indication for unsatisfactory/non-functioning of the following:—
a) Time and calendar
b) Real time clock with battery
c) All display segments
d) Non-volatile memory.

28.11 The meter serial number, consumers name and address, C.T. and P.T. ratio and date with time of taking reading shall invariable be available at base computer software.

28.12 The meter shall be factory programmed for each and every month for minimum 20 years at the time of manufacture and correctness of 20 years calendar. In addition following parameters should also be factory programmed:—

a) Integration period
b) Display sequence

28.13 The meter shall have provision of reading in the absence of power through an external source. An inductive coupling arrangement shall be provided so that it should not be possible to damage the circuit of the meter by applying excess voltage directly in the meter. The meter should be powered up using an external battery pack only in absence of power supply to the meter to enable taking of meter readings through display and optical communication port. The supplier has to supply one no. Power Pack unit with each lot of 100 nos. of meters without any extra cost in case of external source of supply. In case of internal battery back up for reading and data downloading through MRI in absence of power supply, the battery must be able for a backup time of minimum 7 days (168 hrs) as per Clause 39.2 .

28.14 Meter shall invariably be provided with LCD display cycling facility for essential parameters, as envisaged under clause No. 7.0 of the technical specification.

28.15 While installing the meter, it shall be possible to check the correctness of the C.T. & P.T. connections to the meter and their polarity with the help of common meter reading instrument.

28.16 The meter and related instruments, when installed, shall be constructed in a way offering full protection against contact voltage, other hazards resulting from/or related to the operating principle and the utilization of the equipment. In particular if any metal part accessible while covers are in place, then the base shall be fitted with protective Earth terminal identified by the Earthing symbol ⊥ and connected to all accessible metal parts.

28.17 **The Static Trivector Meter shall have memory capacity to store followings parameters**

28.8.1 The static tri vector meter shall measure and retain previous 12 months data (month wise) of the KWH and KVAH reading at 2400 hrs. of the last days of each calendar month, along with monthly consumption in kwh and kvAh for each month including current month consumption. Average power factor and maximum demand with date and time of occurrence of that particular month . These parameters shall also be obtainable through common meter reading instrument whenever required of last 12 months.

28.8.2 The meter shall also have memory capacity to measure & retain tampers evident data of 200 events in compartments as per DLMS (treated occurrence & restoration as separate event). Upto 50 events configured in one compartment which will rollover on FIFO basis(except the non roll over events).

28.8.6 The meter shall record three phase voltage, current, power factor separately with KWh and KVAh energy, at the time of each event (except power ON/OFF.)

28.8.7 Meter shall also store & communicate instantaneous electrical parameters, vector representation as and when meter data downloaded from meter to MRI at BCS end.

28.8.8 The meter shall have sufficient memory capacity to store above parameters with defined duration / frequency / numbers of event with FIFO basis.

28.18 The meter shall be provided with an accurate quartz crystal based real time clock. The maximum drift permissible in the real time clock shall be ±5 minutes per year for class 1.0S Meters.

80.0 Maximum Demand Registration And Resets:

The meter shall continuously monitor and calculate the average maximum demand for each interval of time of 30 minutes and maximum of these shall be stored along with date and time when it occurred. The meter shall automatically store the 30 minute average demand. At the end of every 30 minutes, the new calculated demand should be compared with previous maximum demand and

stored whichever of them is higher. The maximum demand for every calendar month along with the date and time when it occurred should be registered.
The maximum demand shall automatically reset at 24.00 Hrs. of the last date of each calendar Month for which minimum 20 calendar years shall be programmed by the manufacturer at his work.
The meter shall be provided with its own real time clock calendar with built in battery backup and time derived from this clock shall be used for maximum demand intervals. The meter shall display the maximum demand reset count.

81.0 LOAD SURVEY CAPABILITY & BILLING POINT REQUIREMENTS:

Measure & retain minimum Load Survey data of past 2 months to store average KW, KVA, PF, 3 phase voltage and current parameters of 30 min integration period. It shall be possible to select either demand or energy view at the BCS end.

The load survey data can be downloaded & presented in the form of bar charts as well as in spread sheets. The BCS shall have the facility to give complete load survey data both in numeric and graphic form.

82.0 BILLING PARAMETERS

The predefined date and time for registering the billing parameters of KWh, KVAh , KVA and kW MD as well as Tamper Count and Power-on hours readings shall be 24:00 Hrs of the last day of every month . All current billing parameters shall be transferred to billing registers.
The above billing data, TOD register's data, load survey data, tamper information data shall all be retrievable through the meter's communication port through a common meter reading instrument (CMRI) and shall be transferred (downloaded) to a PC with windows based software to get complete details in numerical and/or graphic form. The necessary base computer software (BCS) for this purpose shall be provided by the supplier with complete details.

83.0 SELF DIAGNOSTIC FEATURE:

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

a. Time and date and
b. All display segments as per the requirement under G 19 of IS 14697.
c. Real Time Clock (RTC)
d. Non Volatile Memory (NVM)

If possible, the details of malfunctioning should be recorded in the meter memory.

84.0 TAMPER AND FRAUD PROTECTION

Tamper detection Feature	Occurrence			Restoration		
	Voltage	Current	Occurrence Time	Voltage	Current	Restoration Time
Voltage Failure	< 55% Vbasic	Ignored	5Min	> 55% Vbasic	ignored	2Min

Current Open	Ignored	Iph<2% Ib & CT Bypass >15% Ib& No current reversal in any Ph	5Min	Ignored	Iph>2% Ib or CT Bypass <15% Ib	2Min
Current reversal	Vref	Iph> 10% of Ib& Power factor> 0.5 in that phase and current flow in reverse direction	5Min	Vref	10% of Ib& Power factor> 0.5 in that phase and current flow in forward direction	2Min
Voltage unbalance	V max-Vmin>30% Vref	Ignored	5Min	V max-Vmin< 30% Vref	ignored	2Min
Current Bypass	Ignored	CT Bypass >20% Ib&Iph> 2% Ib(in all phases) & No current reversal in any Ph	5Min	Ignored	CT Bypass < 20% Ib or any Iph< 2%Ib	2Min
Current unbalance	Ignored	I max-Imin>30% Ib	5Min	Ignored	I max-Imin< 30% Ib	2Min
Magnetic logging	Meter shall record at Imax ,**Whenever effected by magnetic field. Ocuurance&resoration within 30 sec**					
Neutral disturbance	Vph>1.5 Vref	Ignored	20 Sec	Vph<1.5 Vref	Ignored	20 Sec
	For any abnormal neutral disturbance signal, meter either remains immune or in case the meter functionality is getting affected, neutral tamper will be logged with date and time as an even and meter to record energy (V ref, actual current and UPF will be taken for metering					

Top Cover open	Event will be logged incase of power failure also, "Cover open" message will be activated on display along with date and time. Once the meter cover open display appears on screen, no other reading kwh, kvAh, demand etc should be on display . However the reading shall be available on push button mode. Event is not resettable. Once occurred the event will be there permanently on display					
Low Voltage	55% Vref<Vph<7 5% Vref	Ignored	5Min	Vph<55% or Vph>75% Vref	Ignored	2Min
Over Voltage	115% Vref<Vph<1 50% Vref	Ignored	5Min	115% Vref>Vph>1 50% Vref	Ignored	2Min
Over Current in any phase	Ignored	Iph>12 0% In	5Min	Ignored	Iph<12 0% In	2Min
Power Failure event	When all three phases are switched off for 1 minute and more					

a. The meter shall be capable of recording power and remain functional on all prevailing Tampering practice.

In addition to this, meter should log minimum 10 events for meters authenticated transaction i.e time setting, time zones, Integration period change etc.

b. Meter cannot be put in dead zone (non functioning zone) either by high voltage discharge (Spark) upto 35KV& by any external high frequency source. Hidden memory fully secured for outer / internal impact compare actual supply parameters & if functionally meter gets changed/change in parameters, the tamper shall be logged and suitable display on meter LCD shall be given. **35KV Spark test** – The meter (without box) shall be capable to withstand 35KV and should be immune if applied on the terminal, optical port and all sides of meter.

c. **DC Immunity**: The meter shall not saturate on passage of direct current which can cause the meter either to stop recording/record inaccurately. Measurement by meter shall not get influenced by injection of chopped signal/DC signal /DC pulse of low frequency.

d. **Snap Shots** The meter shall record three phase voltage, current, power factor separately with KWh and KVAh energy at the time of each tamper event (except power on off) with the date and time.

e. While connecting 3 phase capacitive bank unit to meter, under balance and unbalanced pure capacitive load meter should not log current reversal and should not increment in active energy (at no-load condition).

f. The meter shall keep working accurately irrespective of the phase sequence of the supply.

i. Mid night snap shot is required for configured energy (Active, Reactive Lag and lead and Apparent) for last 35 days.

j. Provision should be there for indication of existing tamper status in the meter preferably providing additional LED on meter body/LCD annunciator which should glow/display in case of tamper existing

85.0 **TAMPER LOGIC:**

Properly designed meter tamper logic should be provided. The tamper logic should be capable of discriminating the system abnormalities from source side and load side and it should not log/record tamper due to source side abnormalities.

There shall be minimum five separate compartments for logging of different types of tampers.

Bidder under their offer should explain the logging of various tampers in each compartment.

Once one or more compartments have become full, the last tamper event pertaining to the same compartment will be entered and the earliest (first one) tamper event should disappear. Thus, in this manner each succeeding tamper event will replace the earliest recorded event, compartment wise. Events of one compartment/category should overwrite the events of their own compartment/category only.

Bidders may indicate alternate proposals for the above tamper detection and logging scheme. Tamper

count should increase as per occurrence (not restoration) of tamper events. The total number of tamper counts should also be provided on the meter display as well as at the BCS end.

86.0 **TAMPER PERSISTENCE TIME:**

The tamper persistence time for logging/registration of an occurrence of a tamper should be 5 minutes +/- 10 seconds. The persistence time for logging of restoration of tamper should not be more than 120 seconds.

87.0 Time Of Day (TOD) Tarrif:

Meter should be able to store apparent and active energies (forward) consumption along with maximum demand in Kw and KVA for at least different 8 time zones.

Meter shall be able to record and store apparent and active energies, consumption along with maximum demand in KVA during specific peak hours described as following time Zone of register in sequence:—

a) 17.00 to 18.00 Hrs.
b) 18.00 to 22.00 Hrs.
c) 22.00 to 23.00 Hrs.
d) 23.00 to 05.00 Hrs.
e) 05.00 to 06.00 Hrs.
f) 06.00 to 08.00 Hrs.
g) 08 Hrs..00 to 11.00 Hrs.
h) 11.00 to 17.00

The starting of display of TOD zones shall be from 17:00 hrs to 18:00 hrs as first slot and last slot as 11:00 hrs to 17:00 hrs.

The meter shall have facility for recording and storing of TOD consumption and maximum demand data on minimum Three Tariff Rates, per day basic.

It should be possible to change the time period for TOD recordings through the portable device or programmable BLOCK installed in the meter itself or manually with proper security at site. The main control for this change shall be available on the computer located at the Metering Office.

88.0 Communication Capability:

The meter shall also have facilities for data transfer locally through CMRI via an optically isolated communication port using serial communication.. It should be possible to configure meter for TOD tariff demand integration period, billing date, real time clock and date etc. through CMRI locally without any extra cost to MVVNL, but the same shall be done by the manufacturer only after taking due approval of MD, MVVNL or his authorized representative. The meters shall have a galvanically isolated optical communication ports as per IEC 1107 so that it can be easily reading instrument for data transfer. The meter shall have additional RJ11 (RS232)/Micro USB (RS232) port along with optical port for reading data through CMRI and AMR modem. Communication ports shall not be affected by any type of infection/unauthenticated signals. The baud rate should not be less than 9600 bps and higher baud rate shall be preferred for down loading the data. The complete data shall be downloaded within 5 minutes from meter to CMRI & from CMRI to BCS.

The bidder shall supply software required for local (CMRI) & remote (AMR) connectivity including required training to use the software free of cost. Both the communications port may work simultaneously**.** Separate communication cords for optical port and RJ11 (RS232)/Micro USB (RS232) port have to be supplied with each meter free of cost duly fitted with meter box with a provision of reading the data without opening the meter box. Also the meter box shall have provision of sealing optical port. RJ11 port should have sealing provision at the meter body. **The bidder shall provide meters as per DLMS compliance i.e. meters with open protocol as per IS: 15959 Category "C" for consumer metering.**

89.0 Software:

Software for reading, down loading data of the meter and TOD programming in the meter,normally resident in the Common Meter Reading Instrument (CMRI), software suitable for MS- DOS 5.0 or higher version.

Windows based Base Computer Software (BCS) for retrieving data from CMRI and downloading instructions from base computer software to CMRI. This BCS should have, amongst other requirements and features and facilities described later in this specification, the facility to convert meter reading data into user definable ASCII file format so that it may be possible for the user to integrate the same with the user's billing data and process the selected data in desired manner.
Necessary software for loading application program via CMRI serial port.The following software shall be made available and installed on CMRI & BCS by the firm whose meters are to interface with CMRI without any extra charges. Any future up gradation in both the software shall also be provided free of cost.

(a) Software to be resident in CMRI for the purpose of reading and programming the specific make(s) of static meters.

(b) Base computer stations (BCS) software for accepting data for CMRI, processing generating reports and down loading instruction from the BCS to CMRI. The firm will also provide ASCII conversion utility alongwith BCS software for processing of the billing data.

(c) The firm shall install the above software without any extra cost on call from one of the Test Division located in each of the Zones. The purchaser will arrange these software installations in rest of the existing and future Test Divisions for which necessary softcopies with appropriate licences shall be provided by the firm.

(d) It should not be possible to re-program the meter at site (write facility through optical port). The meter programming through optical port shall not be acceptable except time of day (TOD) and real time clock (RTC). Provision for programming of TOD and RTC shall necessarily be provided.

(e) For efficient and speedy recovery of data read through CMRI, view & analysis, a Base Computer Software (BCS) shall have to be supplied having the following features:

(c) The BCS software shall be windows based (windows 98 & all higher version) user friendly. The data transfer shall be highly reliable and fraud proof. Base Computer software shall give all details adequate for analysis and abnormal event data & load surveys parameters. The software shall have the facility to convert all the consolidated information / data of selectable parameters into ASCII format. EDP department of purchaser can generate its own DBF (data base files) to downloaded all the required information into it.

Platform:

The BCS shall be executable on MS WINDOWS 98, WINDOWS 98, WINDOWS-2003 XP, WINDOW XP PROFFESIONAL, VISTA, WINDOWS 2007 or higher updated operating platform or higher operating system. The BCS shall be suitable to run on IBM PC or compatible hardware platform.

(ii) Meter Data Display:

The software shall show electrical condition existing at the time of reading the meter in tabular forms as well as graphical format (Phase diagram with phase angle)

All the information about energy, maximum demand and their respective TOD register reading, billing register readings shall be shown in a manner which user can easily understand.

All the load survey data shall be available in numerical as well as graphical format. It shall be possible to view this data daily, weekly, and monthly format. The load survey graph will show values where the cursor is placed for the selected or for all parameter.

All the information about abnormality events shall be accompanied with date and time stamping of respective electrical conditions. This information shall be displayed in the sequence in which it happened in cumulative format as well as summary format.

BCS should display the Date and Time for followings - Meter Reading, MRI taken at site and MRI dump in the computer. The software shall be capable of preparing CMRI to read the meter information or time setting of the meter.

(iii) Support Display:

There shall be "user friendly" approach for viewing meter data for the reading collected now or for the reading collected in the past. All information about a particular consumer will be sorted out and available at one place so that locating any consumer 's past data is easy. It shall be possible to retrieve/locate data on the basis of either one of the following particulars:

a) Site ‘s ID/Numbers.
b) Meter Sr. No.
c) Date of meter reading. d) Location.

BCS of the bidder should support the supplied meters of it own make

(iv) The Data Transfer:

It shall be possible to transfer data to and fro from CMRI through serial interface.

(v) Configurability :

It shall be possible to have selective print out of all available data of the meter. Print out shall not include anything and everything available with the BCS. The software shall support "print wizard" whereby user can decide what to print out.

The use of the software need not revert back to the supplier of the software for modifying the software just to print what he desires.

BCS shall have facility to export data to ASCII or spreadsheet format for integrating with the purchaser's billing system. Here again an "Export wizard" or similar utility shall be available whereby user can select file format, what data to export, the field width selection etc.

(vi) Security:

The BCS shall have multilevel password for data protection and security. The first level shall allow the user to enter the system. The different software features shall be protecting by different passwords. The configurable of passwords shall be user definable. The software installed on one PC shall not be capable on another PC.

(vii) **Help :**

The exhaustive online help shall be available with the software so that user can use all the features of the software by just reading the help contents.

Necessary software for loading application program via CMRI through serial port. Also meter reading data downloading facility directly from meter to laptop with 1 cord per 500 meter shall be provided with desired software.

90.0 **SALIENT FEATURES:**

The meters shall have the following additional salient features:-

39.9 Meter shall have provision of Phase indicators to show healthiness of individual voltages. In addition to above, phase indicators shall blink in case of connection abnormality persist at meter terminal.

39.10 The meter shall have provision of reading in the absence of power through an external source. An inductive coupling arrangement shall be provided so that it should not be possible to damage the circuit of the meter by applying excess voltage directly in the meter. The meter should be powered up using an external battery pack only in absence of power supply to the meter to enable taking of meter readings through display and optical communication port.

39.11 If any bidder proposes for Internal Battery backup in the meter in case of mains supply failure for meter reading and meter data downloading, no power shall be consumed for this circuit when mains are available to recharge the battery.In case of power failure data downloading for Historical energy, maximum Demand & all the tamper events through CMRI (common meter reading instrument) shall be possible though battery internal /external backup. Rechargeable capacitor back up power shall not be used for display under Power absence condition. To verify that the sample meters are not having capacitor rechargeable battery, the samples will be kept in power off conditions for 7 days (168 hrs.) and then meters will be checked by pressing the push button and the CMRI shall be done."

39.12 The meter should work accurately irrespective of phase sequence of the mains supply only in forward direction.

39.13 The meter preferably shall have scroll lock facility to lock desired parameter from push button displays parameter.

39.14 The meter should remain powered up and functional even when either any two phases or any one phase with neutral is available to the meter.

39.15 The meter should continue to record accurately as per prevailing electrical conditions even if the neutral of potential supply gets disconnected.

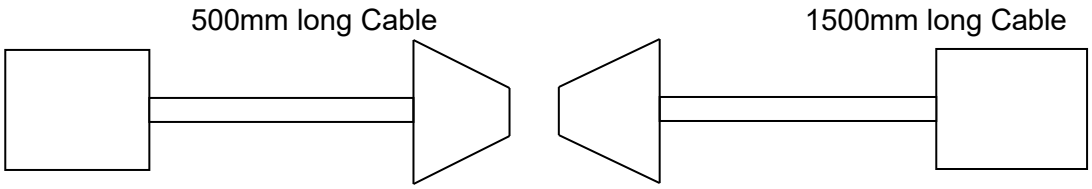
39.16 The meter shall remain powered up and functional on all prevailing tamper practices.

Interface With MS Dos Based Cmri:

For Physical interface between meter and Common Meter Reading Instruments shall consist of meters optical sensor terminating into a 9 Pin D type male connector with a cable of 500mm + 10mm length with

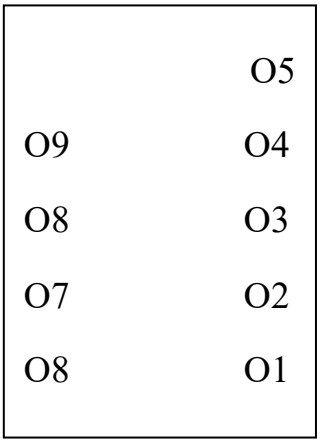
a provision of reading the data without opening the meter box. Also additional RJ11 port at the meter body shall have sealing provision.

Illustration No.1



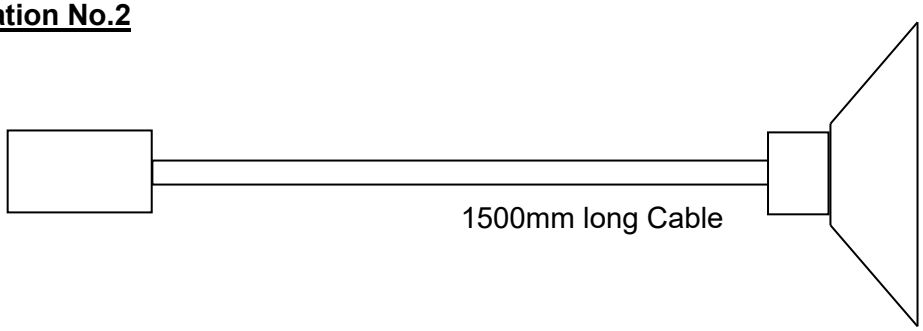
Optical Port for connecting to Meter 9 pin Male 9 pin female Connection to CMRI

The configuration of 9 Pin D type male connector shall be as given below:



PIN	SIGNAL NAME
01	NC
02	TRANSMIT DATA (TXD)
03	RECEIVE DATA (RXD)
04	NC
05	SIGNAL GROUND (SG)
06	NC
07	NC
08	NC
09	POWER SUPPLY

Illustration No.2



Connection to CMRI 9 Pin Female connector to Base Computer Station (BCS)

91.0 Drawing And Manual:

40.1 The firm is required to submit one copy of drawing and manual with the tender documents and in each packing case of energy meters for use of field offices.

40.2 Maintenance and repair manuals including instructions for testing adjustments and calibration shall be submitted with the contractual documents.

92.0 **MINIMUM TESTING FACILITIES:**

The tenderer should have the necessary minimum testing facilities for carrying out the following tests:

1. AC voltage test
2. Insulation resistance test
3. Test of limits of errors
4. Test of meter constant
5. Test of starting condition
6. Test of no load condition
7. Repeatability of error test
8. Test of power consumption
9. ESD Test at 35 KV
10. Tamper conditions - as per this specification

The manufacturer should have duly calibrated RS meter of Class 0.2 accuracy or better. Manufacturer also should possess fully computerized meter test bench system for carrying out the relevant routine/acceptance tests as well as facility to generate test reports for each and every meter tested.

93.0 Purchaser reserves the right to ask the successful Bidder to carry out complete type testing and anti-tamper feature test on the sample meter from their delivered lot, from any of the below mentioned test laboratories at their own cost, which shall be reimbursed by purchaser on submission of successful type test reports as per IS : 13779 : 1999 (read with latest revision thereof)/CBIP technical report No. 304 with latest revision thereof.

94.0 <u>Inspection And Testing:</u>

43.8 All meters shall be duly tested and sealed by the firm at their premises prior to inspection. Manufacturer seal may be provided on one side of meter. For the other side, the seal with engrave as Utility name may be sent in a pack for provision by utility after completion of test by the utility & after receipt of the meter.

The utility/ purchaser may inspect the meter randomly as per sampling plan for acceptance test as per IS 16444. The meters shall be tested for all functional requirements as part of acceptance test as per IS 16444 . After testing, these sample meters shall be additionally sealed and would be kept in safe lock for verification if needed.

43.9 The manufacturer shall have NABL accredited laboratory to ensure accurate testing calibration as per IS 13779 for acceptance test.

43.10 Each lot of meters offered for supply shall be inspected for routine/ acceptance and anti tamper feature test at manufacturers' works to verify that these are being supplied in accordance with relevant standards/ technical specification and guaranteed technical particulars.

43.11 Inspection of material shall be carried out by the representatives of DISCOM

43.12 While offering a lot for inspection/testing, confirmation to the effect that meter have successfully withstood to routine/ acceptance and anti tamper feature test, (Enclosing test results) alongwith packing list shall be submitted to Superintending Engineer (MM), MVVNL, Lucknow as well as to purchaser.

At the times of inspection and testing the firm shall however submit all routine test results of all meters offered, to the inspection officer.

43.13 All instruments used in inspection and testing should be properly calibrated and sealed once a year. Calibration Certificate when demanded by the inspecting officer shall be provided / produced for verification purposes. In case of any dispute regarding calibration, instruments shall be sealed and signed by the representative of the firm and purchaser and will be sent to test house Government lab/ Government Institution of repute, for calibration at the cost of firm.

43.14 Purchaser reserves the right to get the meters inspected/ tested before dispatch by any Independent Inspecting Agency, at the cost of purchaser.

95.0 **TESTS:**

The type test reports/certificates/records for all type tests specified having been successfully performed on the type of meter offered shall be submitted with the tender.
The bidder shall clearly bring out the deviations from this specification clause by clause whether on account of tests or manufacturing process or features incorporated in the meter. The tender lacking with above information and without supporting test reports for meter meeting the requirement of tests laid in this specification are likely to be rejected.

96.0 <u>Type Test:</u>

Smart meter shall be type tested for all the type tests as per IS: 16444 (latest version) in a third party independent lab. The number of sampling for testing of meters and criteria for conformity would be as per IS 16444. Necessary copies of test certificates shall be submitted as per agreement with the utility.

45.1 <u>Schedule Of Type Test Shall Be As Follows:</u>

45.1.1 Test of Insulation Properties:

(g) Impulse voltage test

(h) a.c. High voltage test

(i) Insulation resistance test

45.1.2 Test of Accuracy Requirements:

(q) Test on limits of error

(r) Interpretation of test results

(s) Test of meter constant

(t) Test of starting condition

(u) Test of no-load condition

(v) Test of ambient temperature influence

(w) Test of repeatability of error

(x) Test of influence quantities

45.1.3 Test of Electrical Requirement:

(m) Test of power consumption test

(n) Test of influence of supply voltage

(o) Test of influence short-time over currents

(p) Test of influence of self-heating

(q) Test of influence of heating

(r) Test of influence of immunity to earth fault

45.1.4 Test for Electromagnetic Compatibility:

(k) Radio interference measurement

(l) Fast transient burst test

(m) Test of immunity to electrostatic discharges

(n) Test of immunity to electromagnetic HF field

(o) Surge Immunity Test

(as per Clause 7.2.6 of **IEC62052**-11)

45.1.5 Test for Climatic Influences

(g) Dry heat test

(h) Cold test

(i) Damp heat cyclic test

45.1.6Test for Mechanical Requirement

(k) Vibration test Shock test

(l) Spring hammer test

(m) Protection against penetration of

(n) dust and water

(o) Test of resistance to heat and fire

NOTE — Following tests shall be carried out to assess for smart meter functional condition and functionality of communication module after the 'Type test and acceptance test' for metrology is carried out but before 'Test of resistance to heat and fire':

a) Accuracy of the meter at pre-defined points [5 percent *I*b,*I*b and *I*max] UPF.

b) Access and Data Read Test

c) Remote Disconnect/Connect

Manufacturer shall demonstrate the functionality of communication module by data read test, that is readingkWh energy register through the communication module.

97.0 Influence Of High Magnatic Field Asper CBIP Technical Report No. 88 (Revised June 2000 or Latest Revision) Read With 3rd Amendment/Errata Feb. 2002

Meter Shall be provided with appropriate magnetic shielding so that any external magnetic field (A.C. electromagnet or D.C. magnet) as per the values specified in CBIP report no. 304 (amended), applied on meter would not affect the proper functioning of meter. Also when magnetic field such as 0.5 Tesla is applied on the meter (which is above the immunity level as defined in CBIP report), it shall record at I max. at UPF.

Influence of Spurious signal : The meter should record accurately in case of DC or spurious signal through neutral and meter should log such condition with date and time. If influenced.

Note: Any other type test if included in IS/IEC/CBIP standard (latest revision) or test as per revised limits have to be done on PROTO-TYPE sample meter.

98.0 The firm shall supply the meter as per specification/drawing as type tested. If any change in the design/parameters is being made, then the meter shall have to be type tested again at the cost of the firm.

99.0 Routine Test:

All the meters offered for supply shall be tested by the manufacturers at their works so as to conform that these are being manufactured in accordance with the technical specification/ISS. A copy of these routine test results shall be enclosed along with the packing list at the time of offering the material for inspection. The Factory Acceptance and Routine tests shall be carried out as per IS 16444. Apart from above test, meter shall be also be tested for all functional requirement through communication as part of acceptance test.

100.0 Acceptance Tests:

As per IS 16444.

101.0 **Surge Test**: The offered should be capable to withstand surge immunity test as per IEC 62052-11 2003 and amendments thereof. Bidder shall have to submit type test report along with offer for this test also.

102.0 Number of Samples and Criteria for Conformity:

Type tests shall be applied to three test specimens. In the event of one specimen failing to comply in any respect, further three specimens shall be taken, all of which shall comply with the requirement of standards.Additional one sample for test for data exchange protocol shall be submitted.

The requirement given in **12** of IS 13779 shall apply

NOTE — Smart meter is to be submitted along with communication module in its place as integral part of the meter.

103.0 Test for Data Exchange Protocol

This test shall be carried out on optical port as per 10.5 of IS 16444.

The test shall be performed on a separate sample.

104.0 Tests for Smart Meter Communicability: As per 10.6 of IS 16444.

105.0 Smart Meter Functional Requirements: As per Clause 11 of IS 16444

106.0 Sample Meter :

Three no sample meter of 3 PHASE, 4 WIRE A.C. STATIC Smart Meter (10-60 Amps) along with type test report must be submitted with the offer. Sample meters of the firms meeting pre-qualifying condition of the tender, shall be tested at any of the Government Lab, as per technical specification and relevant IEC/IS. However right to have meter tested at any Test lab of DISCOM/UPPCL is reserved with purchaser. Date of testing will be informed to all bidders. Engineer of the bidder shall come with BCS and CMRI so that tamper information with date & time, load survey and meter readings could be downloaded by CMRI and printout could be taken to verify the internal features also. Part-II will be opened for only those bidders whose sample meters will pass in testing.

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7.4 Technical specification of Pilfer proof SMC Box to house LT TVM & Cables

The specification covers the supply of anti-corrosive, dust and shock proof, heat resistant, vermin & water proof and pilfer resistant box for distribution transformer metering. Meter boxes are made of thermosetting plastic i.e. Glass reinforced polyester sheet moulding compound (SMC) confirming to IS: 13410 (1992)

1) CONSTRUCTION OF METER BOX:

a)The meter box shall comprise of moulded single base and doors. The construction the box shall be of single base type. The meter box shall generally comply with the provision of IS-14772 or other equivalent standard. The boxes shall be suitable for outdoor/indoor application and suitable to mount Meter, modem & modem antenna.

b)Colour of the box shall be off white / grey. The thickness of the box shall not be less than 2.0 mm on all sides including door. The top surface of meter box shall have tapering shape for easy flow of rainwater.

c)The meter box shall have a groove all round to hold soft rubber gasket with corresponding tongue in door to ensure tongue & groove type sealing arrangement in addition to gasket sealing for protection against entry of dust and water.

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

e)The box shall confirm to IP-54.

f)Meter box cover shall be fitted to base by minimum 2 hinges. The boxes shall be closed by 'U' shape clamp of minimum 0.8 mm thickness for holding of the door. The "U" clamp shall have hole through which it is possible to seal the box for sealing purpose.

g)Viewing window with toughened glass / Polycarbonate shall be provided, fixed from inside.

h)Box mounting holes (4 Nos.) with minimum 8mm diameter shall be provided on back side of meter box for fixing of box on the pole along with fixing arrangement.

i)For CT secondary cable entry 1 Nos. holes having dia of hole minimum 20-25mm shall be provided at bottom of box with good quality HDPE / Engineering plastic gland.

j)One no. earth bolt of 6mm diameter x 25mm length with 2 nos. nuts and 2 nos. washers plus a spring washer shall be provided. The earthing arrangement shall be of M.S. with zinc passivated. Earthing symbol is to be provided near the earthing bolt.

k)All metal parts shall be zinc passivated.

l)Additional provision for housing the GPRS/ 4G/Nb-iOT modems in the SMC Box as per drawing of modem:-

2) TECHNICAL SPECIFICATION FOR ALL CABLE AS IN BOQ:

a) All types/sizes cable technical specification (Guarnteed Technical Perticulars) shall be as per respective IS and standards. GTP/Drawing has to be submit as per standard technical specification.

Guaranteed Technical Particulars Pilfer proof SMC Box to house LT TVM

Sl. No.	Technical Particulars	Required Values	Guarantees Values
1	Material of the Meter Box	Glass reinforced Polyester sheet molding compound (SMC) conforming to ISS: 13410:1992	
2	Grade of material	SMC as per ISS: 13410 Grade S-1	
3	Colour of the Box	Gray/OFF white	
4	Dimension of the Box (L X W X H)	To be specify by bidder (including space for modem)	
5	Thickness of box	2.0mm (Min.)	
6	Clearance between meter and meter box		
a	Top	30 mm (Min.)	
b	Both sides	30 mm (Min.)	
7	Hinges provided on door	Concealed Hinge	
8	Viewing Window		
A	Material	Toughened Glass / transparent Polycarbonate sheet	
B	Dimensions	To be specify	
9	Sealing arrangement	Holes for wire seal, minimum 2 Nos.	
10	Whether inlet and outlet arrangement for control cable	One hole along with HDPE / Eng. Plastic cable gland at bottom side	
11	Earthing Provision	M6x20 mm Bolt (MS Zink Passivated)	

7.5 Communication Infrastructure

RF based network should either use license free frequency band available in India and / or get necessary approvals from designated authorities. The engagement of network service provider would be in the scope of AMI Implementing Agency to meet the performance level as given in the document.

a. The communication infrastructure shall be based on RF mesh network in combination with cellular network.
b. The back-haul arrangement between DCU and HES shall be on NBIoT/5G-4G-2G.
c. The communication network shall be based on suitable standards from ITU/ IEC/ IEEE/ CEN/ CENELEC/ ETSI for NAN and WAN network.
d. Communication network shall provide reliable medium for two-way communication between various nodes (smart meter) & HES.
e. RF based network shall use Unlicensed or Licensed frequency band as permitted by WPC.
f. In this type of communication network, different nodes (smart meters) shall interconnect with each other using RF mesh network and they shall communicate with nearby routers to transfer the data to access points.
g. In such communication network, if any routers/repeaters/access points fail, then nodes connected on that device shall automatically reconfigure the mesh with available nearby nodes.
h. The general functionalities for the Router based RF network are specified below:
    i. The communication network shall have dynamic & self-healing capability. If one of the communication element like router or access point fails then nodes connecting to that element shall switch to best available element for communication of data to HES.
    ii. It shall support IPv4 / IPv6 network addressing.
    iii. Each node shall keep a track of best available nearby nodes.
    iv. The communication network equipment shall use Unlicensed or Licensed frequency band as permitted by WPC.
    v. All the communication network equipment shall be certified by WPC, Government of India for operation in license free frequency band.
    vi. The engagement of network service provider would be in the scope of Contractor to meet the performance level as given in the document.
    vii. Suitable network management system (NMS) shall be available to monitor the performance of the communication network round the clock. The NMS shall provide viewing of all the networking elements deployed at site and enable configuration, parameterization of the networking devices and the nodes.
    viii. It shall support remote firmware upgrading
    ix. It shall be secure enough to avoid all cyber threats like DDoS, spoofing, malwares etc.
    x. The communication network shall ensure secure communication of data to HES.
    xi. The equipment shall be weatherproof, dustproof and constructed for outdoor installation on poles (minimum rating: IP-55). A suitable mounting provision shall be made for the equipment.
    xii. Enclosure: Provision for security sealing shall be provided and in case the gasket of the cover is used for protection against moisture, dust and insects, the gasket shall be made of weather and aging resistant material.
    xiii. Routers / Access Points shall have suitable power supply arrangements. Provision of battery backup for at least 5 hour shall be there to continue operation in case of power

supply failure. The life expectancy of battery shall be 5 years or more.

2. General Requirements

2.1. The bidder shall design reliable, interference free & robust communication network. It shall be flexible in terms of providing communication in variable terrain & urban density.

2.2. The bidder shall design the network architecture keeping in view the existing and planned infrastructure of the utility. During designing, suitable consideration shall be kept for future expansion as per requirement of Utility. Before designing the communication network, the bidder shall do the site survey and would provide the most efficient communication infrastructure.

2.3. The entire infrastructure & associated civil works required for installation & commissioning of equipment/devices like DCUs, repeaters, routers & access points etc. shall be in the scope of bidder. The operational testing of all the network elements has to be demonstrated by the bidder to the satisfaction of the utility.

2.4. The quality of installation of the various equipment & power supply wiring to all field equipment shall be as per standards/ regulations/prevailing practices of the utility. The supply of electricity needed for operation and maintenance of entire AMI system shall be the provided by the utility free of cost.

2.5. A suitable network management system (NMS) shall be provided to monitor the performance of the communication network round the clock. The NMS shall provide viewing of all the networking elements deployed at site and enable configuration & parameterization of the networking devices and the nodes.

3. Network Security

The Network shall have adequate cyber security measures not limited to the measures as described below. The network security would be extended to all the interfaces also.

a. **Secure Access Controls**: The system shall include mechanisms for defining and controlling user access to the operating system environment and applications. Best practices from enterprise security including password strength, password aging, password history, reuse prevention etc. must be followed for access control.
b. **Authorization Controls**: 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.
c. **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.
d. **Hardening**: 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.
e. **Malicious Software Prevention**: Implementation of anti-virus software and other

malicious software prevention tools shall be supported for all applications, servers, data bases etc.

4. Communication Network Elements

The Bidder may either use Data Concentrator Unit (DCU) based RF Mesh Communication Network or Router based RF Mesh Network.

4.1. Data Concentrator Unit (DCU) based Communication Network

The Data Concentrator Unit is a gateway for communication of data between the Smart Meters and the HES. The Data Concentrator Unit receives information from the Smart Meter on a scheduled / need basis and stores the data, which can be accessed by HES for onward transfer to MDM.

The DCU provides the central link between Smart Meters and HES, enabling continuous/periodic meter read and control. DCU shall exchange data from smart meters on RF / PLC communication and with HES on WAN.

4.1.1. Hardware & Power Supply of DCU

- Enclosure/box of DCU shall be minimum IP55 or better compliant. A suitable mounting arrangement required for DCU installation shall also be provided.
- A suitable and optimum power supply shall be provided keeping in view that even in case of outage in one or two phases, DCU can be powered. DCU should be capable of withstanding surges & voltage spikes of 6KV as per IEC 61000-4-5 standards. Power supply shall be terminated on suitable sized MCB to facilitate isolation during on-site maintenance.
- DCU shall have battery with backup for 5 hour for normal meter reading, to push tamper event, carry out on demand reading and the network health status/ connectivity continuity & check. DCU should have the suitable feature to send power outage and restoration message to the HES. The battery shall have a guaranteed life of 5 years.
- DCU shall have built in Real Time Clock (RTC) with separate battery backup. The battery shall have a guaranteed life of 5 years. It shall have self- diagnostic feature for RTC, memory, battery, communication module, etc. Alternatively, Software driven RTC may also be used as per agreement between supplier and utility.

4.1.2. Configuration, Functionality & Interface of DCU

DCU shall have following configuration functionalities:

- It shall be able to configure the communication with underlying nodes/meters.
- It shall pull data from the field devices and push the data at configured intervals to the HES. It should also support the HES in pulling data from the field devises/meters. The data acquisition (Push/Pull) frequency shall be programmable. DCU shall be capable to prioritize control commands.
- DCU shall ensure a secure communication to HES and shall have internal memory for storing interval data for at least 5 days.
- DCU shall support on demand read and ping of individual/group of meters.
- It shall support IPv4 and IPv6 network addressing.

- DCU shall push events like tamper, power off etc. to HES immediately on occurrence/receipt from field devices/meters.
- The equipment shall be weatherproof, dustproof and constructed for outdoor installation on poles (minimum rating: IP-55). A suitable mounting provision shall be made for the equipment.
- Enclosure: Provision for security sealing shall be provided and in case the gasket of the cover is used for protection against moisture, dust and insects, the gasket shall be made of weather and aging resistant material.
- The list of standards followed in all the devices/equipment used in communication network shall be furnished

4.1.3. DCU Communication

- The communication architecture shall be any, as defined under IS 16444.
- The DCU shall ensure the appropriate backhaul for secure transfer of data to HES either via NBIoT/5G-4G-2G) or Fiber Optic communication. In case of NBIoT/5G-4G-2G backhaul, it shall support SIM card with dynamic IP from any service provider. It shall have Wide Area Network (WAN) connectivity to the HES through suitable means.
- DCU shall be able to communicate with meters either on RF mesh (Unlicensed or Licensed frequency band as permitted by WPC) or PLC.
- DCU shall periodically monitor meter reads/downstream commands and shall retry and reconnect in case of failed events/reads.
- It shall push events like tamper, power off etc. to HES immediately on occurrence/receipt from field devices/meters. DCU shall be able to acquire and send data to HES for full capacity (as per designed for no. of meters/field devices) to ensure the performance level. Full capacity of DCU is required to be indicated in the offer.
- After Power Interruption, on restoration of power supply, DCU shall establish communication with underlying devices as well as upstream application automatically.
- DCU shall be able to communicate with the nearest meters depending on topographical features. For further communication among the meters, distance of the other meters with the DCU shall not be a constraint as communication of the nearest meters shall be established with other meters through appropriate mesh formation / other formation.
- Remote Firmware Upgrade: The DCU shall support remote firmware upgrades as well as remote configuration from the control center. Configuration of programmable parameters of smart meters shall be done through HES.
- All meters falling under one DCU shall be commissioned and checked for proper communication in presence of utility in-charge.
- DCU shall keep the records of minimum of the following events:
    - No of packet failures
    - Retry attempts
    - Missed periodic readings
    - Failure to connect
    - Tamper events

4.2. Router based RF Mesh Network

In this type of communication network, different nodes (smart meters) shall interconnect with each other using RF mesh network and they shall communicate with nearby routers to transfer data to

access points/ HES. In such communication network, if any routers/repeaters/access points fail, then nodes connected on that device shall automatically reconfigure mesh with available nearby nodes.

4.2.1. General Requirement of Router based RF Mesh Network:

The general requirements for the Router based RF network are specified below:

a. The communication network shall have dynamic & self-healing capability. If one of the communication element like router or access point fails then nodes connecting to that element shall switch to best available element for communication of data to HES.
b. It shall support IPv4 and IPv6 network addressing.
c. Each node shall keep a track of best available nearby nodes.
d. The communication network equipment shall use Unlicensed or Licensed frequency band as permitted by WPC.
e. All the communication network equipment shall be certified by WPC, Government of India for operation in license free frequency band.
f. Suitable Network Management System (NMS) shall be available to monitor the performance of the communication network round the clock. The NMS shall provide viewing of all the networking elements deployed at site and enable configuration, parameterization of the networking devices and the nodes.
g. It shall support remote firmware upgrading
h. It shall be secure enough to avoid all cyber threats like DDoS, spoofing, malwares etc.
i. The communication network shall ensure secure communication of data to HES.
j. The equipment shall be weatherproof, dustproof and constructed for outdoor installation on poles (minimum rating: IP-55). A suitable mounting provision shall be made for the equipment.
k. Enclosure: Provision for security sealing shall be provided and in case the gasket of the cover is used for protection against moisture, dust and insects, the gasket shall be made of weather and aging resistant material.
l. The list of standards followed in all the devices/equipment used in communication network shall be furnished.
m. Routers / Access Points shall have suitable power supply arrangements. Provision of battery backup for at least 5 hour shall be there to continue operation in case of power supply failure. The life expectancy of battery shall be 5 years or more.

4.2.2. Configuration, Functionality & Interface

Access points shall have following configuration functionalities:

a. It shall be able to configure the communication with underlying nodes/end points.
b. It shall support on demand read and ping of individual/group of meters.
c. It shall push events like tamper, power off etc. to HES immediately on occurrence/receipt from field devices/meters.
d. It shall have Wide Area Network (WAN) connectivity to HES through suitable means.
e. It shall communicate with routers/nodes/end points on RF mesh (Unlicensed or Licensed frequency band as permitted by WPC).
f. It shall periodically monitor meter reads/downstream commands and shall retry and

reconnect in case of failed events/reads.

g. After power Interruption, on restoration of power supply, it shall establish communication with underlying devices as well as upstream application (HES) automatically.
h. Access point shall facilitate recording of:
   i. No of packet failures
   ii. Retry attempts
   iii. Missed periodic reading
   iv. Failure to connect
   v. Tamper events
i. It shall be capable to handle interval data of suitable nos. of any type of smart meter (1ph/3ph). Access point shall be able to acquire and send data to HES for full capacity (No. of meters/field devices it is designed for) within a suitable time period to achieve the performance level. Full capacity of access point is required to be indicated in the offer.
j. Access point shall support remote firmware upgrades as well as remote configuration from the control center.

4.3. Testing of the DCU /Access Point

DCU/Access Point shall be tested for the following:

i. Radio interference measurement (CIS PR 22)
j. Surge test (IEC 610004-5)
k. Fast transient burst test (IEC 61000-4-4)
l. Test of immunity to electrostatic discharges (IEC 61000-4-2)
m. Test of immunity to electromagnetic HF field (IEC 61000-4-3)
n. Resistance to heat and fire

The bidder shall provide IP-55 compliance test certificate for DUC/Access Point.

4.4. Details of the DCU shall be as under:

Sno	Particulars	Details
1	**Power supply**	
1.1	Power supply range	3*240V AC
1.2	Surge withstand capacity	4KV
3	Default Baud Rate	9600
4	Temperature Range	-30 +80
5	Humidity	95%
6	Frequency Band RF	865-867 MHz
7	Antenna Options	External
8	Networking Typologies	Mesh
9	RF Range	150 meter LOS
10	Channels	9
11	RF Data Rate	50 kbps
12	Modulation	MR-FSK
13	Encryption	AES
14	Networking layer Standard	6LowPAN Open standard: RF944 and associated
15	Addressing	Ipv6
16	Communication Type	RF Mesh/ NBIoT/5G-4G-2G
17	Firmware Upgrade	YES
18	Radio Compliance	WPC
19	Gatway Configuration	locally and remotely

20	LED indication	RS232 Led, RF Communication, NBIoT Led , 5G-4G-2G Led, RSSI Led, Power
21	RF Standard	IEEE 802.15.4g
22	Reboot	Remote, AUTO and Manual Reboot
23	Time Sync	Support for time synchronization
24	RTC	Inbuilt

FORM 'A'

GENERAL CONDITIONS FOR THE SUPPLY OF PLANT AND THE EXECUTION OF WORKS IN CONNECTION WITH SCHEMES IN MADHYANCHAL VIDYUT VITARAN NIGAM LTD.

1. Definition of terms

In construing these general conditions and the annexed specification, the following words shall have the meaning here in assigned to them unless there is anything in the subject or context inconsistent with such construction.

"The purchaser" or the Board shall mean the MVVNL and shall include his successors and assigns.

The "Contractor" Shall mean the Tenderer whose tender shall be accepted by the purchaser and shall include such Tenderer's heirs, legal representatives, successors and assigns.

The "Sub Contractor" shall mean the person named in the contract for any part of the work or any person to whom any part of the Contract has been sublet with the consent in writing of the Engineer and the heirs, legal representatives successors and assigns of such person.

The "Engineer" shall mean the officer placing the order for the work, with the contractor and such other officer as may be authorized and appointed in writing by the purchaser to act as Engineer for the purpose of the contract and in case of such officer has been so appointed, the purchaser or his duly authorised representative.

"Plant", "Equipment", "Material", "Work" or "Works" shall mean respectively the plant and materials to be provided and work or works to be done by the contractor under the contract.

The "Contract" shall mean and include the general conditions, specifications, schedules, drawings, Form of Tender, covering Letter, Schedule of Prices, or the final General Conditions, Specifications and drawings, and the agreement to be entered into under clause 3 of these general conditions.

"The Specification" shall mean the Specification annexed to these General Conditions and the schedules thereto (if any).

The "Site" shall mean the site of the proposed work as detailed in the Specifications or and other place in Utter Pradesh where work is to be executed under the Contract.

"Test on Completion" shall mean such tests as are prescribed by the Specification to be made by the contractor before the plant is taken over by the purchaser.

"Commercial Use" shall mean that use of work, which the contract contemplates or of which it is commercially capable.

"Month" shall mean calendar month.

"Writing" shall include any manuscript, typewritten or printed statement under or over signature or seal as the case may be.

Words importing person shall include Firms, Companies, Corporations and other bodies whether incorporated or not.

Words importing the singular only shall also include the plural and vice versa where the context requires.

2. Contractor to inform himself fully

The Contractor shall be deemed to have carefully examined the General Conditions, Specifications, Schedules and Drawing. If he shall have any doubt as to the meaning of any portion of these General Conditions or of the Specifications, he shall, before signing the Contract, set forth the particulars there of and submit them to the Engineer in writing in order that such doubt may be removed.

3. Contract

A formal agreement shall if required by the purchaser, be entered into between the Purchaser and the Contractor for the proper fulfillment of the Contract.

Further, if required by the purchaser, the Contractor shall deposit with the Purchaser as security for the due and faithful performance of the Contract such sums not being less than one percent of the total value of the Contract as

may be fixed by the purchaser either in cash or in any other form approved by the Purchaser. The security deposit shall be refunded to the Contractor on the satisfactory completion of tests and the taking over of the plant by the purchaser.

The charge in respect of vetting and execution of the contract document shall be borne by the contractor. The Contractor shall furnish with an executed stamped counter-part of the Agreement. The import licence fee will in each case have to be paid by the contractor. Import licence may have to be taken in the Board's name.

After the tender has been accepted by the Purchaser, all order or instructions to the Contractor shall except as here in other wise provided, be given by the Engineer on behalf of the Purchaser.

4. Contract Drawings

Contractor shall submit in duplicate, to the Engineer for his approval, drawings of the General Arrangement of the works to be carried out and of such detailed drawings other than shop drawings as may be reasonably necessary.

Within fourteen days of the receipt of such drawings, the Engineer shall signify his approval or otherwise of the same, and in the event of his disapproving the drawing, the contractor shall submit further drawings of approval.

Within a reasonable period of the notification by the Engineer to the Contractor of his approval of such drawings, three sets in ink on tracing cloth or ferrogalic prints mounted on cloth of the drawings as approved shall be supplied to him by the Contractor and be signed by him and by the contractor respectively and thereafter deemed to be the "Contractor Drawings".

These drawings when so signed shall become the property of the Purchaser and be deposited with the Engineer, and shall not be departed from in any way what so ever except by the written permission of the Engineer as here in after provided. During the execution of the works one of the sets of drawings shall be available for reference on the site.

In the event of the contractor desiring to possess a signed set of drawings he shall supply four sets instead of three sets in this case the Engineer shall sign the fourth set return the same to the Contractor.

The Contractor if required by the Engineers shall supply in addition copies of any drawings other than shop drawing which may be reasonably be required for the purpose of the Contract and may make a reasonable charge of such copies.

The Engineer, or his duly authorised representative, whose name shall have previously been communicated in writing to the Contractor, shall have the right, at all reasonable times, to inspect at the factory of the Contractor, drawings of any portion of the work and plant.

5. Mistake in Drawings

The Contractor shall be responsible for and shall pay for any alterations of the work due to any discrepancies, errors and omission in the drawings or other particulars supplied by him whether such drawings or particulars have been approved by the engineer or not provided that if such discrepancies, errors or ommission are due to inaccurate information or particulars furnished to the Contractor by the Engineer, any alterations in the work neccessiated by reason of such inaccurate information or particular shall be paid for by the purchaser.

If any dimensions figured upon a drawing or plant differ from those obtained by scaling the drawing or plan, the dimension as figured upon the drawing or plan shall be taken as correct.

6. Subletting of Contract

The Contractor shall not, without the consent, in writing of the Engineer or Purchaser, which shall not be unreasonably withheld assign or sublet his Contract, or any substantial part there of other than for raw materials for minor details, or for any part of the work of which the makers are named in the Contract, provided that any such consent shall not relieve the Contractor from any obligation, duty, or responsibility under the contract.

7. Patent rights

In the event of any claim or demand being made or action being brought against the purchaser for infringement or alleged infringement of letters- patent in respect of any machine, plant, work or thing used or supplied by the Contractor under this Contract or in respect of any method of using or working by the purchaser of such machine plant, work or thing the Contractor will indemnify the Purchaser against such claim or demand and all costs and expenses arising from or incurred by reasons of such claims or demand PROVIDED THAT the Purchaser shall notify that Contractor immediately any claim is made and that the Contractor shall be at liberty if he so desires with the assistance of the Purchaser if required but at the Contractor's own expenses, to conduct all negotiations for the settlement of the same or any litigation that may arise there from and PROVIDED THAT no such machine, plant, work or thing shall be used by Purchaser for any purpose or in any manner other than that for which they have been supplied by the Contractor and specified under this Contract.

7 A. Training of Engineers

The Contractor shall train at his works Engineer/Engineers of the Purchaser in the manufacture and assembly of machinery and its parts for a period of.....a separate agreement for such training shall be signed by the Engineer /Engineers selected for training, the Purchaser and the Contractor on the form appended hereto.

8. Quality of Material

The Plant shall be manufacture and constructed in the best and most substantial and most workman like manner and with material of the best or of approved qualities for their respective uses.

9. Packing

The Contractor shall be responsible for securely protecting and packing the plant so as to avoid damage under normal conditions of transport.

10. Delivery

The cost of delivering the whole of the material f.o.r. at the railway station specified or on the site as the specification may define and the cost of the packing and unless otherwise agreed, import duties and customs dues shall be borne by the Contractor.

11. Fencing and lighting for works other than transmission lines

Except as hereinafter provided that purchaser shall unless otherwise specified be responsible for the proper fencing, guarding, lighting and watching of all works other than transmission lines comprised in the Contract and for the proper provision of temporary, roadways, footway, guards and fences as for the same may be rendered necessary by reason of the work for the accommodation and production of foot-passenger or other traffic and of the owners and occupies of adjacent property and of the public.

11 A For transmission lines

The Contractor shall at all time provide sufficient fencing, notice boards, lights and watchman to protect and warn the public and guard the work of transmission lines and in case the Contractor fail to maker such provision or the provision made by him is considered by the Purchaser to be inadequate, the Purchaser may make such provision or further provisions as he may consider necessary and charge the cost there of the Contractor.

11B <u>For all works</u>

If during the period of erection of a plant the Contractor or his workman or servant shall injure of destroy any part of a building or other structure contiguous to the work in progress of if any damage shall be caused from any cause whatsoever to other works (whether in progress or completed) forming part of the work for which the plant is being installed or if and imperfections become apparent in these works the causes of which imperfections are attributable to the Contractor or his workmen or servants, the Contractor shall make good such damages and imperfection and if he fails to do so within a reasonable time the Purchaser may cause the same to be made good and may deduct the cost there of from any sum that may then or at any time thereafter become due to the Contractor or from his security deposit or the proceeds of sale thereof or of a sufficient portion there of or may recover it otherwise.

12. <u>Power to vary or omit work</u>

No alterations, amendments, omission, additions, suspensions of variations of the work (hereinafter referred to as “Variation”) under the Contract as shown by the drawings of the specification shall be made by the Contractor except as directed in writing by the Engineer, but the Engineer shall have full power, subject to the provision hereinafter contained, from time to time during the execution of the Contract by notice in writing to instruct Contractor to make such variation with out prejudice to Contract, and the Contractor shall carry out the such instructions and be bound by the same conditions as for as applicable, as through the said variation occurred in the specification. If any suggested variations would in the opinion of the Contractor, if carried out prevent him from fulfilling any of his obligations or guarantees under the Contract he shall notify the Engineer thereof in written and the Engineer shall decide forthwith whether or not the same shall be carried out and if the Engineer confirms his instruction the Contractor’s obligations and guarantees shall be modified to such an extent as may be justified. The difference of cost, if any occasioned by any such variations, shall be added or deducted from Contract price as the case may require. The amount of such difference, if any, shall be ascertained and determined in accordance with rates specified in the Schedule of Prices, so far as the same may be applicable and where the rates are not contained in the said Schedules or are not applicable they shall be settled by the Engineer and Contractor, jointly, as far as possible, before such variations are carried out. provided that the Purchaser shall not become liable for the payment of any charge in respect of any such variation, unless the instruction for the performance of the same shall have been given in writing by the Engineer.

In the event of the Engineer requiring any variations, such reasonable proper notice shall be given to the Contractor as will enable him to make his arrangement accordingly, and in case where goods or materials have already been prepared or any designs, drawings or patterns have been made or work done that require to be altered, the Engineer shall allow such Compensation in respect there of as he shall consider reasonable.

Provided that no such variation shall except with the consent in writing of the Contractor, be such as will involve an increase or decrease of total price payable under the Contract by more than 10 percent there of.

In every case in which the Contractor shall receive instructions from the Engineer for carrying out any work which either then or later will in the opinion of the Contractor, involve a claim for additional payment, the Contractor shall, as soon as reasonably possible after the receipt of such instructions, inform the Engineer of such claim for additional payment.

13. Negligence

If the Contractor shall neglect to execute the work with due deligence and expedition, or shall refuse or neglect to comply with any reasonable orders given him in writing by the Engineer in connection with work or shall contravene any provision of Contract the purchaser may give seven days notice in writing to the Contractor, to make good the failure neglect or contravention complained of and if the Contractor shall fail to comply with the notice within a reasonable time from the date of service thereof in the case of a failure, neglect or contravention capable of being made good within that time, then and in such case the Purchaser shall be at liberty to employ other workmen and forthwith perform such work as the Contractor may have neglected to do, or if the purchaser shall think fit, it shall be lawful for him to take the work wholly, Or in part out of the Contractor's hands and give it to another person on contract at a reasonable price or provided any other materials, tools tackles or labour for the purposed of completing the work, or any part thereof and in that event the Purchaser shall, without being responsible to the Contractor for fair wear and tear of the same have free use of all the materials, tools, tackles or other things which may be on the site, for use at any time in connection with the work to the exclusion of any right of the Contractor over the same, and the Purchaser shall be entitled to retain and apply any balance which may be otherwise due on the Contract by him to the Contractor or such part thereof as may be necessary to the payment of the cost of executing such work as aforesaid.

If the cost of executing the work as aforesaid shall exceed the balance due to the Contractor, and the Contractor fails to make good the deficiency the Purchaser may recover it from the Contractor in any lawful manner or the Purchaser may sell the said materials, tools tackle or other things belonging to the Contractor, and the proceeds of such sale shall be applied toward the payment of such deficiency and the costs of and incidental to such sale and any balance remaining after crediting the same shall be paid to the Contractor on the Certificate of the Engineer, provided that when all expenses cost and charges incurred in the completion of the work are paid by the contractor, all such materials; tools, tackle or other things remaining unsold shall be removed by the Contractor.

14. Death, Bank-ruptcy, etc

If the contractor shall die or commit any act of bankruptcy, or being a corporation commence to be wound up except for reconstruction purposes or carry on its business under a receiver, the executors, successors or other representative in law of the estate of the contractor or any such Receiver, Liquidator, or any person in whom, the contract may become vested shall forthwith give notice thereof in writing to the Purchaser and shall for one month during which he shall take all reasonable steps to prevent a stoppage of the work have the option of carrying out the Contract subject to his or their providing such guarantee an may be required by the Purchaser but not exceeding the value of the work for the time being remaining unexecuted. In the event of stoppage of the work period of the option under this clause shall be fourteen days only provided that should the above option not be exercised, the Contractor may be determined by the Purchaser by notice in writing to the contractor and the Purchaser may exercise the same power which he should exercise and will have the same right which he could have under the proceeding clause if the work had been taken out of Contractor's hand under that clause.

15. Inspection & Testing

The Engineer and his duly authorised representative shall have testing at all reasonable times the access to the Contractor's premises, and shall have the power at all reasonable time to inspect and examine the materials and workmanship of the plant during its manufacture there and if part of the plant is being manufactured on other premises the Contractor shall obtain for the Engineer and for his duly authorised representatives permission to inspect it as the plant was manufactured on the Contractor's own premises.

The Engineer shall on giving seven day's notice in writing to the Contractor setting out any grounds of objections which he may have in respect of the work, be at liberty to reject all or any plant or workmanship connected with such work which in his opinion are not in accordance with the contract or are in his opinion defective for any reason whatever provided that if such notice be not sent to the Contractor within reasonable time after the grounds upon which such notice is based have come to the knowledge of Engineer he shall not be entitled to reject the said plant or workmanship on such grounds unless specifically provided otherwise all tests shall be made at he Contractor's works before shipment.

15 A. Test at Contractor's Premises

The Contractor shall, if required, give the Engineer notice of any materials being ready for testing and the Engineer or his said representatives if so desires shall, on giving twenty-four hours previous notice in writing to the Contractor, attend at the Contractor's premises with in seven days of the date on which the material is notified as being ready, failing which visit the Contractor may proceed with the tests which shall be deemed to have been made in the Engineer presence, and he shall forth with forward to the Engineer duly certified copies of tests in duplicate.

In all cases where the Contractor provides for tests whether at the premises of the Contractor or of any Sub-Contractor, the Contractor, except where otherwise specified shall provide free of charges such labour, materials, electricity, fuel, water, stores, apparatus and instruments as may reasonably be demanded to carry out efficiently such tests of the plant in accordance with the contract and shall give facilities to the Engineer or to his authorised representative to accomplish such testing.

If special tests other than those specified in the contract are required they shall be paid for by the Purchaser as "Variations" under clause 12.

When the tests have been satisfactorily completed at the Contractor's works the Engineer shall issue a certificate to the effect.

15 B Test on Site

In all cases where the Contract provide for test on the site, the Purchaser, except where otherwise specified, shall provide free of charges, such labour, material, electricity, fuel, water, stores apparatus and instruments as may be required from time to time and as may reasonably be demanded efficiently to carry out such test of the plant or workmanship in accordance with Contract. In the case of the Contractor requiring electricity for test on site such electricity shall be supplied to the Contractor in the most convenient form available.

16. Delivery of Plant

No plant shall be forwarded until shipping instruction shall have been given to the Contractor.

Notification of delivery or dispatch in regard to each and every consignment shall be made to the purchaser immediately after dispatch or delivery. The supplier shall further supply to the consignee a priced invoice and packing account of all stores delivered or dispatched by him. All packages containers, bundles and loose materials forming part of each and every consignment shall be described fully in the packing account and full details of the contents of packages and quantity of materials shall be given to enable the consignee to check the stores on arrival at destination.

17. Access to site and Work on site.

Suitable access to and possession of the site shall be afforded to the Contractor by the Purchaser in reasonable time and the Purchaser shall have any foundations to be provided by him ready when required by the Contractor. where a crane is available, its safe lifting capacity shall be stated in the specification and shall be available for free use of the Contractor until the plant is taken over.

The work, so far as it is carried out on the Purchaser's premises, shall be carried out at such time as the Purchaser may approve and so as not to interfere unnecessarily with the Conduct of the Purchaser's business, but, the Purchaser shall give the Contractor all reasonable facilities for carrying out the work

No person other than Contractor, sub-contractor, and workmen and the Contractor's duly authorised agent shall, except with the special permission in writing of the Engineer or his representative, be allowed to do any work on the site in connection with the erection of the work but access to the work shall at all times be accorded to the Engineer and his representatives and other authorised officials or representatives of the purchaser.

The Contractor shall permit the execution of work by other Contractor or tradesmen whose names shall have been previously communicated in writing to the Contractor to the Engineer, and afford them every facility for the execution of their several work simultaneously with his own.

The Purchaser shall provide all the unskilled labour and facilities necessary for the execution of work included in the contract unless otherwise specified.

18. Engineer's Supervision

All the work shall be carried out under the direction and to the reasonable satisfaction of the engineer. If supervision of the erection for complete erection is included in the Contract, the Contractor shall be responsible for the correctness of the positions levels and dimensions of the work according to the drawings, not withstanding that he may gave been assisted by the Engineer in setting out the same.

19. Engineer's Decision

In respect of all matters which are left to the decision of the Engineer, including the granting or with holding of certificate, the Engineer shall if required to do so by the Contractor, given in writing, a decision thereon and his reasons for such decision. If the decision is not accepted by the Contractor the matter will, at the request of the Contractor, be referred to arbitration under the provision for arbitration hereinafter contained but subject to this right of reference to arbitration such decision shall be final and binding on the Contractor.

20. Contractor's Representatives & Workmen

If the supervision of erection or complete erection is also included in the Contract, the Contractor shall employ at least one competent representives and whose name or names shall have previously been communicated in writing to the Engineer by the Contractor to superintendent in the erection of the plant and the carrying out of the works. The said representatives, or if more than one shall be employed then one of such representatives, shall be present on the site during working hours, and any written orders or instructions which the Engineer or, his duly authorised representative whose name shall have been previously communicated in writing to the contractor may give to the said representative of the Contractor shall be deemed to have been given to the contractor.

The Engineer shall be at liberty to object to any representative or person employed by the Contractor in the execution of or otherwise about the works who shall in his opinion misconduct himself or be in competent or negligent and the Contractor shall remove the person so objected to upon receipt from the Engineer of notice in writing requiring him to do so and shall provide in his place a competent representative at the Contractor's expense.

The purchaser shall provide suitable living accommodation on the site for, the use of Contractor's representative unless the contractor exempts his from this liability.

21. Liability for Accidents and Damage

The Contractor shall be responsible for loss, damage or depreciation of the plant until the same is taken over under clause 35 or is deemed under that clause to have been taken over provided always that the Contractor shall not be responsible for any such loss, damage and depreciation occurring during such period that the plant is operated by the purchaser's staff prior to being taken over in accordance with clause 35.

Until the plant is taken over or is deemed to the have been taken over as aforesaid, the Contractor shall also be liable for and shall indemnify the Purchaser in respect of all injury to person or damage to property resulting from

the negligence, of the Contractor or his workmen or Sub-Contractors or from defective designs, or work, but not from any other cause.

Provided that the Contractor shall not be liable for any loss of profit or loss of Contract or any other claim made against the Purchaser not already provided for in the Contract not for any injury or damage caused by or arising from the acts of the Purchaser or of any other person or due to circumstances over which the Contractor has no control or shall his total liability for loss, damage or injury in this clause exceed the total value of Contract.

The Contractor will indemnify and save harmless the purchaser against all the actions suits, claims, demands, costs or expenses arising in connection with injuries (other than such as may attributable to the purchaser or his employees) suffered period to the date when the plant shall have been taken over under clause-35 hereof by persons employed by the Contractor or his Sub-Contractor on the work, whether at common Low or under the Workmen's Compensation Act, 1923 or any other statute in force at the date of contract relating to the question of the liability of employers for injuries suffered by employees, and will if called upon to do so take out the necessary policy of insurance to cover such indemnity.

21A. Only applicable to complete erection Contract

In the event of any claim being made, or action brought against the Purchaser involving the Contractor and arising out 0f the maters referred to and in respect of which the Contractor is liable under this clause, the Contractor shall be immediately notified thereof and he shall with assistance, if he so requires, of the Purchaser but at the sole expense of the Contractor conduct all negotiations for the settlement of the same or any litigation that may arise thereof . In such case, the Purchaser shall at the request and expense of the Contractor, afford all reasonable and available assistance for any such purpose.

22. Insurance

The Contractor shall insure the plant and shall keep it insured against loss by theft, destruction or damage by fire, flood, undue exposure to the weather, or through riot, civil commotion, war or rebellion for the full value of the plant from the time of delivery of f.o.b. British port until the plant is taken over under clause 35. This insurance shall also cover loss by theft on site in the case of Contracts where the Contractor, is responsible for complete erection, but not in other cases.

23. Replacement of defective work or materials.

If during the progress of the work the Engineer shall decide and notify in writing to the Contractor that the contractor has executed any unsound or imperfect work or has supplied any plant inferior in quality to that specified the Contractor on receiving details of such defects deficiency shall, at his own expense, within such time as may be reasonably necessary for making it good proceed to alter, reconstruct or remove such work, or supply fresh materials up to the standard of the Specification and in case the Contractor shall fail so to do the Purchaser may on giving the Contractor seven days' notice in writing of his intention so to do, proceed to remove the work complained of, and, at the cost of the Contractor, perform all such work or supply all such material provided that nothing in this clause shall be deemed to deprive the Purchaser of or affect any right under the contract, which he may otherwise have in respect of such defects are deficiencies.

24. Deduction from contract price.

All costs, damages or expenses which the purchaser may have paid, for which under the Contract, the contractor is liable, may be deducted by the Purchaser from any money due or which may become due by him to the Contractor under the Contract, or may be recovered by suit or otherwise from the Contractor.

Any sum of money due and payable, to the contractor (including security deposit returnable to him) under this contract may be appropriated by the Purchaser and set of against any claim of the Purchaser for the payment of a sum of money arising out of or under any other contract made by the contractor with Purchaser.

25. Provisional Sums

In any case where the Contract price includes a provisional sum sums to be provided by the Contractor for meeting the expense of extra work or for work to be done or material to be supplied by a sub Contractor, such sum shall be expended or used, either wholly or in part or be not used at the discretion of the Engineer and entirely as he may decide and direct. If no part or only a part thereof be used then the whole or the part not used as the case may be, shall be deducted from the Contract price. If the sum used is more than such provisional same, the Contractor shall pay the excess. In the case of materials supplied on work done by a Sub Contractor, the total of the net sums paid to the Sub Contractor on account of such materials or work and a sum equal to 10percent of such net sum allowed as Contractor's profit shall be deemed to be the sum used. None of the works or articles to which such sum of money refer shall be done or purchased without the written order of the Engineer. The Contractor shall allow the Sub-Contractor every facility for the supply of materials or execution of their several works simultaneously with his own and shall within fourteen days after the Engineer has requested him in writing so to do pay the dues of such Sub-Contractor on account of such materials or work, PROVIDED ALWAYS that the Contractor shall have no responsibility with regard to such work or articles unless he shall have previously approved the Sub Contractor and/or the material or plant to be supplied.

26. Certificates of Engineers

Every application to the Engineer for a certificate must be accompanied by a detailed invoice (in duplicate) setting forth in the order of the Schedule of prices, particulars of the work executed and the certificate as to such plant or work as in the reasonable openion of Engineer in accordance with the Contract shall be issued within fourteen days if possible or for other than the first payment within such time of application for the same as is reasonably necessary for communication with the site.

The Engineer may by any certificate make any correction or modification in ay-previous certificate which shall have been issued by him and payments shall be regulated and adjusted accordingly.

27. Due Date of Payments

Payment shall be due and payable by the Purchaser in accordance with the provisions of clause 25 here of at the end of the month following that in which invoice for the amounts due together with necessary documents are received by the purchaser, provided that the Purchaser shall not be bound to make any payment under sub-clause(a) of clause-25 unless the amount of such payment represents at least 8 percent of the total contract value of the plant.

28. Certificate not to affect rights of the purchaser or Contractor.

(1) No certificate of the Engineer on account nor any sum paid on account by the purchaser, nor any extension of time granted under clause 31 shall effect or prejudice the rights of the Purchaser against the Contractor either under this agreement or under the law or to relieve the Contractor of his obligations for the due performance of the Contract, or be interpreted as approval of the work done or of the materials supplied.

(2) No certificate of the Engineer shall create liability in the Purchaser to pay for any alteration, amendments, variations or additional work not ordered in writing by the Engineer or absolve the Contractor of his liability for the payment of damages whether due ascertained or certified or not of any sum against the payment of which he is bound to indemnify the purchaser nor shall any such certificate nor the acceptance by him of any sum paid on account or otherwise affect or prejudice the rights of the Contractor against the purchaser under this Agreements or under the law.

29. Suspension of works

The Purchaser shall pay to the Contractor all reasonable expenses incurred by the Contractor by reason of suspension of the works or delay in shipment by order in writing of the purchasers of the Engineer unless such suspension shall be due to some default on the part of the Contractor or Sub-Contractor.

30. Extension of time for completion

The time given to the contractor for dispatch, delivery, erection or completion, as the case may be, shall be reckoned from the date of receipt by the Contractor or the order, together with all necessary information and drawings to enable the work to be put in hand.

In all cases in which progress shall be delayed by strike, lockouts, fire, accident, defective materials, delay in approval of drawing or cause whatsoever beyond the reasonable Control of the Contractor and whether such delay or impediment shall occur before or after the time or extended time for dispatch, erection or completion, a reasonable extension of time shall be granted.

31. Damages for delay in completion

If the Contractor shall fail in the due performance of his Contract within the time fixed by the contract or any extension, thereof, the contractor agrees to accept a reduction of the contract price by ½ (half) percent per week reckoned on the Contract value of such portion only of the plant as can not inconsequence of the delay be used commercially and efficiently during each week between the appointed or extended times as the case may be and the actual time of acceptance under clase35, and such reduction shall be in full satisfaction of the Contractor's liability for delay, but shall not in any case exceed 10(ten)percent of the contract value of such portion of the plant.

32. Tests of Completion

Whenever possible all tests shall be carried out before shipment should however, it be necessary for the final tests as to performance and Completion guarantees to be held over until plant is erected at site they shall be carried out in the presence of the Contractor's representative within one month of the completion of erection. If the result of these tests shall not come within the margin specified, the tests shall, if required be repeated within one month from the date the plant is ready for re-test, and the Contractor shall repay to the Purchaser all reasonable expenses to which he may be put by such tests.

33. Rejection of Defective Plant

If the completed plant, or any portion thereof, before it is taken over under clause35, be found to be defective, or fail to fulfill the requirements of the Contract, the Engineer shall give the contractor notice setting forth particulars of such defects or failure, and the contractor shall forth-with make the defect good; or alter the same to make it, comply, with the requirements of contract. If the Contractor fail to do so with a reasonable time, the purchaser may reject and replace, at the Cost of the contractor, the whole or any portion of the plant, as the case may be which is defective or fails to fulfill the requirements of the contract such replacement shall be carried out by the purchaser within a reasonable time and at reasonable price and where reasonable possible to the same specification and under competitive conditions. In case of such replacement by the Purchaser the Contractor shall be liable to pay to the Purchaser extra cost if any, of such replacement delivered and/or erected as provided for the original Contract, such extra cost being the ascertained difference between the price paid by the purchaser under this provisions above mentioned, for such replacement and the Contract price for the plant so replaced, and also to repay any sum paid by

the purchaser to the contractor in respect of such defective plant. If the purchaser does not so replace the rejected plant within a reasonable time, the Contractor shall be liable only to the purchaser all money paid by the purchaser to him in respect of such plant.

In the event of such rejection, the purchaser shall be entitled to the use of the plant in reasonable and proper manner for a time reasonably sufficient to enable him to obtain other replacement plant. During the period the rejected plant is used commercially the contractor shall be entitled to a reasonable sum as payment for such use.

34. Taking over

Where the specification calls for performance tests before shipment and these have been successfully carried out, the plant shall be accepted and taken over when it has been satisfactorily put into operation on site or within one month of its being ready to be put into operation, whichever shall be the earlier and the Engineer shall forthwith issue a taking over certificate.

In the event of final or any outstanding tests being held over until the plant is erected such taking over Certificate shall be issued subject to the results of such final or outstanding test shall be carried out in accordance with clause-33.

When the specification calls for tests on site the plant shall be taken over and the Taking over certificate issued immediately after such tests have been satisfactorily carried out.

If for any reason other than the default of the contractor such last mentioned test on site shall not be carried out within on month of notice by the Contractor to the Purchaser of the plant being ready for test the plant shall be deemed to have been taken over as on the last day of the such period and payments due to the Contractor on taking over shall be made, but nevertheless the contractor shall if called upon so to do by the purchaser, but at the purchaser's expense, make the said tests during the maintenance period and accept as aforesaid under the same obligation as specified in clause-33.

The Engineer shall not delay, the issue of any taking over Certificate contemplated by this clause on account of minor deficiencies of material or defects in the plant which do not materially affect the commercial use thereof provided that the contractor shall undertake to make good the same in due course.

35. Warranty

For a period of 12 (Twelve) calendar months under guarantee commencing from the date on which the plant is taken over. The Contractor shall remain liable to replace any defective parts that may develop in plant of his own manufacture or those of his Sub-Contractors approved in the clause 6 under the conditions provided for by the Contract under proper use and arising solely from faulty design, materials or workmanship provided always that such defective parts are not repairable at site and are not essential in the meantime to the maintenance in commercial use of the plant are promptly returned to the contractor's works at the expenses of the contractor unless otherwise arranged. If it becomes necessary for the Contractor to replace or renew any defective parts of the plant under this clause, the provisions of the first paragraph of this clause shall apply the parts of the plant so replaced or renewed until the expiration of six months from the date of such replacement or renewal or until the end of the above mentioned period of twelve months whichever may be the later. If any defects be not remedied within a reasonable time the purchaser may proceed to do the work at the Contractor's risk and expense but without prejudice to any other rights, which the purchaser may have against the Contractor in respect of such defects. The repaired or new parts will be delivered in accordance with clause 10. The Contractor shall bear reasonable cost of minor repairs carried out on his behalf at site. At the end of the maintenance period the Contractor's liability shall cease in respect of goods not covered by the first paragraph of this clause, the purchaser shall be entitled to the benefit of any guarantee given to the Contractor by the original supplier or manufacture of such goods.

36. Regulations of Local Authorities

The Purchaser shall throughout the Continuance of the Contract and in respect of all matters arising in the performance thereof, serve all notices and obtain all consent, way leaves approvals and permission required in connection with the regulations and by laws of any local or other authority which shall be applicable to the works.

All work shall be executed in accordance the Indian Electricity Rules, 1956 and any statutory modification thereof, wherever are applicable, unless otherwise agreed to in writing by the Engineer.

37. Arbitration

If any dispute, difference or controversy shall at any time arise between the contractor on the one hand and the MVVNL, and the Engineer of the Contract on the other hand touching the contract, or as to the true construction, meaning and intent of any part or condition of the same, or as to manner of execution or as to the quality or description of or payment for the same, or as to the true intent, meaning, interpretation construction or effect of the clause of the contract, specification or drawings or any of them or as to anything to be, done omitted or suffered in pursuance of the contract or specification, or as to the mode of carrying the contract into effect, or as to the breach or alleged breach of the contract, or as to any claims on accounts of such breach or alleged breach, or as to obviation or compensation for the commission of any such breach or as to any other matter or thing whatsoever connected with or arising out of the contract, and whether before or during the progress or after the completion of the contract, such, question, difference or dispute shall be referred for adjudication to the Managing Director, MVVNL or any other person nominated by him in this behalf and his decision in writing shall be final binding and conculsive. This submission shall be deemed to be submission to arbitration within the meaning of the Indian arbitration Act 1940 or any statutory modification thereof. The arbitrator may form time to time with consent of the parties; enlarge the time for making and publishing the award.

Upon every or any such reference, the costs of an incidental to the reference and award respectively shall be at the discretion of the arbitrator, who shall be competent to termini the amount thereof or direct the same to be taxed as between solicitor and client or as between party and party and to direct by whom and to whom in what manner the same shall be borne and paid.

Work under the Contractor shall, if reasonably possible, continue during the arbitration proceedings and no payment due or payable by the Corporation shall be withheld on account of such proceeding. In case of refusal/neglect by such nominee Managing Director M.V.V.N.L. may nominate another person in his place.

38. Court of Competent Jurisdiction

Any action taken or proceeding initiated on any of the terms of this agreement shall be only in the court of competent Jurisdiction under the High Court of Judicature at LUCKNOW.

Work under the Contract shall if reasonable possible, continue during the Arbitration proceeding, and no payment due or payable by the Purchaser shall be withheld on account of such proceedings.

39. Construction of Contract

The Contract shall in all respects be constructed and operated as a Construction Contract as defined in the Indian Contract Act, 1972, and the payments of Contract there under shall be made in the rupees unless otherwise specified.

40. Marginal Notes

The marginal notes to any clause of this contract shall not affect Marginal or control the construction of such clause.

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FORM 'B'

General Conditions for the supply of Plant and Machinery for Works pertaining to the MADHYANCHAL Vidyut Vitran Nigam Limited, LUCKNOW

1. In construction these General Conditions and the annexed specification the following words shall have the meanings herein assigned to them unless there is anything in the subject or context inconsistent with such construction: The "Purchaser shall mean the MADHYANCHAL Vidyut Vitran Nigam Limited and shall include his successors and assigns. The "Contractor" shall mean the Tenderer whose tender shall be accepted by the purchaser and shall include such Tenderer's heirs, legal representatives, successors and assigns. The "Sub-contractor" shall mean the person named in the contract for any part of the work or any person to whom any part of the Contract has been sublet with the consent in writing of the Engineer and the heirs, legal representative, successors and assigns of such person. The "Engineer" shall mean the officer placing the order for work with the contractor and such other officers as may be duly authorised and appointed in writing by the Purchaser to act as Engineer for the purposes of the contract and in case where no such officer has been so appointed, the Purchaser or his duly authorised representative. "Plant" shall mean the plant and materials to be provided by the Contractor under the contract. The "Contract" shall mean and include the General Conditions, Specifications, Schedules, Drawings. Form of Tender, Covering letter, Schedule of prices or the final General conditions, specifications and Drawings and the Agreement to be entered into under Clause 3 of these "General conditions". The "Specification" shall mean the Specification annexed to these "General conditions" and the schedule thereto (if any). The "Site" shall mean the site of the proposed work as detailed in the Specification or any other place in Uttar Pradesh where work is to be executed under Contract. "Month" shall mean calander month. "Writing" include any 'manuscript' typewritten or printed statement under or over signature or seal, as the case may be. Words importing person shall include Firms, Companies, Corporations and other bodies whether incorporated or not. Words importing the singular any shall also include the plural and vice versa the context requires.	**efinition of terms.**
. The contractor shall be deemed to have carefully examined the General Conditions, Specifications, Schedules and Drawings. If he shall have may doubt as to the meaning of any portion of these General Conditions or of the Specifications he shall before signing the Contract, set forth the particulars thereof and submit them to the Engineer, in order that such doubt may be removed.	**ntractor to inform himself fully**
3. A formal agreement shall, if required by the Purchaser, be entered into between the Purchaser and the Contractor for the proper fulfillment of the Contract. Further if, required by the Purchaser, the Contractor shall deposit with the Purchaser as a security for the due and faithful performance of the contract such sum shall be 10% of the total value of the Contract as may be fixed by the Purchaser either in cash or any other form approved by the Purchaser. The security deposit shall be refunded to the Contract on the delivery and check of the plant at the site of the work. The charges in respect of vetting and execution of the contract document shall be borne by the Contractor. The contractor shall be furnished with an executed stamped counter part of the agreement. After the tender as been accepted by the Purchaser all orders or instructions to the Contractor shall, except as herein otherwise provided be given by the Engineer on behalf of the purchaser.	**Contract**

4. The Contractor shall submit, in duplicate, to the Engineer for his approval drawing of the General Arrangement of the plant to be provided and such detailed drawing, other than shop drawings, as may be reasonably necessary. Within fourteen days of the receipt of such drawings the Engineer shall signify his approval or otherwise of the same, and in the event of disapproving the drawings, the Contractor shall submit further drawing for approval. Within a reasonable period of the notification by the Engineer to the Contractor of his approval of such drawings, three sets in ink on tracing cloth or ferrogallic prints mounted on cloth of the drawings as approved shall be supplied to him by the Contractor and be signed by him and the Contractor, respectively and be thereafter deemed to be the "Contract Drawing:. These drawings when so signed shall become the property of the Purchaser and be deposited with the Engineer, and shall not be departed from any way whatsoever except by the written permission of the Engineer as hereinafter provided. In the event of the Contractor desiring and to process a signed set of drawing, he shall supply four sets instead of three sets and in this case the Engineer shall sign the fourth set and return the same to the contractor. The Contractor if required by the Engineer, shall supply in addition copies of any drawing other than shop drawing which may reasonably by required for the purpose of the Contractor and make a reasonable charge for such copies. The Engineer or his authorized representatives whose name shall have previously been communicated in writing to the Contractor, shall have the right, at all reasonable times, to inspect, at factory of the Contractor, drawing of any portion of the plant.	**ontract drawing**
5. The Contractor shall be responsible for and shall pay for any alterations or the plant due to any discrepancies, errors or omissions in the drawings and other particulars, supplied by him, whether such drawing of particulars have been approved by the Engineer if not, provided that if such discrepancies, errors or omissions are due to inaccurate information of particulars furnished the Contractor by the Engineer any alternations in the plant necessitated by reason of such inaccurate information of particulars shall be paid for by the purchaser. If any dimensions figured upon the drawings or a plan differ from those obtained by scaling the drawing of plant, the dimensions as figured upon the drawing or plan shall be taken as correct.	**stakes in drawing**
6. The Contractor shall not without consent in writing of the Engineer or Purchaser which shall not be unreasonably with held, assign or subject this Contract, or any substantial part thereof other than for raw materials, for minor details, or for any part of the plant, of which the makers are named in the Contract provided that any such consent shall not relieve the contractor from any obligation, duty or responsibility under the Contract.	**Subletting of contract**
7. In the event of any claim or demand being made or action being brought against the Purchaser for infringement or alleged infringement or laters patent, in respect of any machine, plant or things used or supplied by the Contractor under this contract or in respect of any method of using or working by the purchaser of such machine, plant, or thing, the Contractor will indemnify the Purchaser against such claim or demand and all costs and expenses arising from or incurred by reason of such claim or demand provided that the Purchaser shall notify the Contractor immediately and claim is made and that the Contractor shall be at liberty, if he so desires, with the assistance of the Purchaser. If required but at all the Contractor's own expense, to conduct all negotiation for the settlement of the same of any litigation that may arise there from and provided that no such machine, plant, or thing shall be used by the purchaser of any purpose or in any manner other than that or which they have been supplied by the Contractor and specified under this contract.	**Patent rights**
8. The plant shall be manufactured and constructed in the best and most substantial and most workmanlike manner and with materials of the best or of approved qualities for their respective uses.	**uality of material**

9. The Contractor shall be responsible for security protecting and packing the plant so as to avoid damage under normal conditions of transport.	**Packing**
10. The cost of delivering the whole of the material F.O.R. at the Railway stations specified shall be borne by the Contractor. The import Licence fee for the import of equipment or component parts of raw materials, if required shall be paid by the Contractor even when the import Licence may have to be taken in the name of the Purchaser.	**Delivery and ported licence fee**
11. No alterations, amendments, omissions, additions, suspensions, or variations of the plant (hereinafter referred to as "Variation") under the Contract as shown by the contract drawings or the Specifications shall be made by the Contractor except as directed in writing by the Engineer but the Engineer shall have full power, subject to the provision hereinafter contained, from time to time during the execution of the Contract by notice in writing to instruct the Contractor to make such variations without prejudice to the Contract, and the Contractor shall make such variations, and be bound by the same conditions, as far as applicable, as though the said variations occurred in the specification. If any suggested variations would, in the opinion of the Contractor, if carried out, prevent him from fulfilling any of his obligations or guarantee under the contract, he shall notify that Engineer there of in writing, and the Engineer shall decide forthwith whether or not the same shall be carried out, and if the Engineer confirms his instructions, the Contractor's obligations and guarantee shall be modified to such an extent as may be justified. The difference of cost, if any, occasioned by any such variations shall be added t, or deducted from, the contract-price as the case may require. The amount of such deference, if any, shall be ascertained and determined in accordance with the rates specified in the Schedules of Prices, so far as the same may be applicable and where the rates are not contained in the said Schedules, or are not applicable they shall be settled by the Engineer and Contractor jointly, as far as possible, before such variations are carried out provided that that the Purchaser shall not become liable for the payment of any charge in respect of any such variations, unless, the instructions for the performance of the same shall have been given in writing by the Engineer. In the even of the Engineer requiring any variations, such reasonable and proper notice shall be given to the Contractor as will enable him to make his arrangement accordingly, and in cases where goods or materials have already been prepared, or any design, drawings or patterns have been made or work done that required to be altered, the Engineer shall allow such compensation in respect there of as he shall consider reasonable. Provided that no such variations shall, except with the consent in writing of the Contractor, be such as will involve an increase or decrease of the total price payable under the contract by more than 10 percent thereof. In every case in which the Contractor shall receive instructions from the Engineer for carrying out any work which either then or later, will in opinion of the Contractor, involve a claim for additional payment, the Contractor shall as soon as reasonably possible after the receipt of such instructions inform the Engineer of such claim for additional payment.	**ver to vary or omit work**
12. If the Contractor shall neglect to manufacturer or supply the plant with due diligence and expedition or shall refuse or neglect to comply with any reasonable orders given to him in writing by the Engineer in connection with the manufacturer or supply, or shall contravene any provision of the Contract, the Purchaser may give seven day's notice in writing to the Contractor to make good the failure, neglect or contravention complained of any if the contractor shall fail to comply with the notice within a reasonable time from the date of service thereof in the case of a failure, neglect or contravention capable of being made good within that time then and in such case if the Purchaser shall think fit, it shall be lawful for him to take the manufacturer or supply of plant wholly or in part out of the Contractor's hand and give it to another person on contract at the reasonable price and the purchaser shall be entitled to retain and apply any balance which may be otherwise due on the Contract by him to the Contractor or such part thereof as may be necessary, to the payment of the cost of manufacture or supply of such plant as aforesaid.	**Negligence**

13. If the Contractor shall die or commit any act of Bankruptcy, or being a corporation commence to be a wound up except for reconstruction purpose of carry on its business under a receiver, the executors, successors, or other representative in law of the estate of the Contractor of any such receiver, liquidator or any person in whom the contract may become vested shall forthwith give notice thereof in writing to the purchaser and shall for one month during which he shall take reasonable steps to prevent stoppages of the manufacturer of plant, have the option of carrying out the contract subject to his or their providing such guarantee as may be required by the Purchaser, but not exceeding the value of the plant, for the time being remaining unexecuted. In the event of stoppage of the manufacturer of the plant the period of the option under this clause shall be fourteen days only, provided that, should the above option not be exercised, the contract may be determined by the Purchaser by notice in writing to the Contractor, and the Purchaser may exercise the same power which he could exercise and will have the same rights which he would have under the last preceding clause if work had been taken out of the Contractor's hand under that clause.	**eaths, Bankruptcy etc.**
14. The Engineer, and his duly authorised representative shall have at all reasonable times access to the Contractors premises and shall have the power at all reasonable time to inspect and examine the materials and workmanship of the plant during its manufacture there, and if part of the plant is being manufactured on other premises, the Contractor shall obtain for he Engineer and for his duly authorised representatives permission to inspect it as if the plant manufactured on the Contractor's premises.	**spection & testing**
15. The Engineer shall, on giving seven day's notice in writing to the Contractor setting out any grounds of objections which he may have in respect of the work, be at liberty to reject all or any plant or workmanship connected with such work which, in his opinion, are not in accordance with the Contract, or are in his opinion, defective for any reason whatsoever; Provided that, if such notice be not sent to the Contractor within reasonable time after the grounds upon which such notice is based have come to the knowledge of the Engineer, he shall not be entitled to reject the said plant or workmanship on such grounds. Unless specifically provided otherwise all tests shall be made Contractor's works before shipment. The Contractor shall, if required, give the Engineer notice of any material being ready for testing, and the Engineer, or his said representative, if so desired, shall on giving twenty four hours previous notice in writing to the Contractor attend at the Contractor's premises within seven days of the date of which the material is notified as being ready, failing which visit the Contractor may proceed with the test, which shall be deemed to have been made in Engineer's presence, and he shall forthwith forward to the Engineer due certified copies of the tests in duplicate. In all cases where the Contractor provides for tests, whether at the premises of the Contractor or of any subcontractor, the Contractor, except where otherwise specified, shall provide, free of charge, such labour, materials, electricity, fuel, water stores, apparatus and instruments as may reasonably be demanded to carryout efficiently such test of the plant in accordance with the Contract and shall give facilities to the Engineer or to his authorised representative to accomplish such testing. If special tests other than those specified in the Contract are required they shall be paid for by the Purchaser as variations, under clause 1.1. When the tests have been satisfactorily completed at the Contractor's work the Engineer shall issue a certificate to that effect. In all cases where the Contractor provides for test on the site, the Purchaser, except otherwise specified, shall provide, free of charge, such labour, materials, electricity, fuel, water, stores apparatus and instruments as may be requisite from time to time and as may reasonably by demanded efficiently to carry out such test of the plant or workmanship in accordance with the Contract. In the cases of Contractor requiring electricity for test on site such electricity shall be supplied to contractor in the most convenient form available.	**st at contractor's premises** **Test on site**
16. The plant or material shall not be forwarded until shipping dispatch instructions shall have given to the Contractor.	**Delivery of plant**

Notification of delivery or dispatch in regard to each and every consignment shall be made to the Purchaser immediately after dispatch or delivery. The supplier shall further supply to the consignee a priced invoice and packing accounts of all stores delivered or dispatched by him. All packages, containers, bundles and loose materials forming part of each and every consignment shall be described in fully in the packing account, and full details of the contents of packages and quantity of materials shall be given to enable the consignee to check the stores on arrival at destination.	
17. The manufacture and supply of plant shall carried out under the direction and to the reasonable satisfaction of the Engineer.	**Engineer's supervision**
18. In respect of all matters which are left to the decision of Engineer, including the granting or with holing of certificates, the Engineer shall, if required so to do by the contractor, give in writing the decision thereon, and his reasons for such decision. If the decision is not accepted by the Contractor, the matter shall, at the request of the Contractor, be referred to arbitration under provision of arbitration hereinafter contained, but subject to the right or reference to arbitration. Such decisions shall be final and binding on the contractor.	**gineer's decisions**
19. The Contractor shall be responsible for loss, damage of depreciation to goods up to the delivery at site.	**Liability for accidents and damage**
20. If during the progress of manufacture or supply of plant, the Engineer decide and notify in writing to the Contractor that the Contractor manufactured any plant or part of unsound or imperfect, or has supplied and plant inferior in quality to that specified, the contractor on receiving the details of such defects of deficiency shall, at his own expenses, within such time as may be reasonably necessary for the purpose proceed to alter, reconstruct or remove such plant or part of plant, supply fresh material up to the standard of specification and in case the Contractor shall fail to do so the Purchaser may, or giving the Contractor seven day's notice in writing of his intention, so to do proceed to alter, reconstruct or remove such plant or part of plant of supply of such materials at the Contractor's cost provided that nothing in this clause shall be deemed to deprive the purchaser of or affect any right under the contract which he may otherwise have in respect of such defects or deficiencies.	**Replacement of efective plant or aterial deduction**
21. All costs, damages or expenses, which the Purchaser may have paid, for which under the contract, the Contractor is liable, may be deducted by the Purchaser from any moneys due or which may become due by him to the Contractor under this Contract, or may be recovered by suit or otherwise from the Contractor. Any sum of money due and payable to the contractor (including security, deposit returnable to him) under this contract may be appropriated by the Purchaser and set off against any claim of the Purchaser for the payment of a sum of money arising out of or under any other contract made by the Contractor with the Purchaser.	**om contract price**
22. (1) Subject to any deduction which the Purchaser may be authorised to make under the contract, or subject to any addition or deduction provided for under clauses 11, the Contractor shall, on the certificate of the Engineer be entitled to payment as follows: (a) Ninety percent of the FOR contract value of the plant along with 100% GST as applicable on finished material/equipment shall be made through bank, intimated by the Purchaser in Rs. or receipt by the Purchaser of the Contractor's invoice giving the number and date of the railway receipt covering the dispatch of the plant from the Indian Port and of the advice note giving case number and contents, together with a certificate by the Contractor to the effect advice note has actually been that the plant detailed in the said dispatched under the said railway receipt and that the Contract value of the said plant so dispatched is not less than the amount entered in the invoice. (b) Ten percent of the FOR contract value on presentation of the contractor's invoice when each commercially useable section of the plant is complete and the last portion of such section has been dispatched and the whole material has been delivered at the place fixed for delivery and checked	**erms of payment**

at the site of the work, within one month or such delivery, whichever is earlier. (c) In case the material is dispatched by road transport, 100% payment along with GST etc. shall be made by the purchaser on receipt of material and check at site only but within one month of receipt of material Provided that each of the payments under this clause shall be due on the last of the month in which the invoice for the amount due together with the necessary documents is received by the purchaser, provided also that the Purchaser shall not be bounded to make any payment under sub-clause (a) unless the amount of such payment represent at least 8 percent of the total contract value of the plant. (2) If at the time at which the last installment becomes payable there are minor defects in the plant which are to of such importance as to affect the full commercial use of the plant, then the Purchaser shall be entitled to retain such part of the installments as represents the cost of making good such minor defects, and any sum so retained shall, subject to the provisions of clause 30, become due upon such minor defects being made good. (3) If the Purchaser desires that the plant or any portion should not be dispatched by the Contractor when it is due for dispatch, the Contractor shall store such plant or portion at his works and be responsible for all risk. For such storage the Purchaser shall pay the Contractor at a rate to be mutually agreed upon between the parties, but no exceeding 5s (five shillings) per ton per week payable quarterly plus interest at percent per annum above the current rate of the State Bank of India, on 80 percent of the contract value of the plant or portion thereof so stored, for the period from the date on which the said plant or portion become due and is ready for shipment upto the date on which it is actually shipped.	
23. In any case where the contract price includes a provisional sum to be provided by the contractor for meeting the expenses of extra work or for work to be done or materials to be supplied by the sub-contractor, such sum shall be expended or used either wholly or in part, or be not used at the discretion of the Engineer, and entirely as he may decide and direct. If no part or only a part there of be used, then the whole or the part used, as the case may be, shall be deducted from the contract price. If the sum used is more than such provisional sum the Contractor shall pay the excess. In the case of materials supplied or work done by a sub-contractor, the total of the net sum paid to the sub-contractor on account of such materials or works and a sum equal to 10% of such net sum allowed as Contractor's profit shall be deemed to be the sum used. None of the works or articles to which such sum of money refers shall be done or purchased without the written order of the Engineer. The Contractor shall allow the sub-contractors every facility for the supply of materials or execution of their several works simultaneously with his own, and shall within fourteen days after the Engineer has requested him in writing so to do, pay the dues of such sub-contractors on account of such materials or work; PROVIDED ALWAYS that the contractor shall have no responsibility with regards to such works or articles unless he shall have previously approved the sub-contractor and or the material or plant to be supplied.	
24(1)Every application to Engineer for a certificate must be accompanied by a detailed invoice (in duplicate) setting fourth in the order of the Schedule of price, particulars of the plant supplied and the certificates as to such plant as is the reasonable opinion of the Engineer, in accordance with the Contract shall be issued within fourteen days of the application for the same. (2) The Engineer may, be any certificates make any correction or modification in any previous certificate which shall have been issued by him and payments shall be required and adjusted accordingly.	**Certificates of Engineer**
25. No certificate of Engineer on account nor any sum paid on account by the Purchaser, nor any extension of time granted under clause 26 shall affect or prejudice the rights of the Purchaser, against. The Contractor either under this agreement or under the law, or relieve the Contractor of his obligations for the due performance of the contract, or be interpreted as approval of the plant manufactured or supplied, and no certificate of the Engineer shall create liability on the Purchaser to pay for any alteration, amendments, variations or additions not ordered in writing by the Engineer or absolve the	**Certificate not to fect rights of the purchaser of contractor**

Contractor of his liability for the payment of damages whether due, as contained or certified or not or of any sum against the payment of which he is bound to indemnify the Purchaser, nor shall any such certificates nor the acceptance by him of any sum, paid on account of otherwise affect or prejudice the rights of the Contractor against the Purchaser, either under this agreement or under the law.	
26. The Purchaser shall pay to the Contractor all reasonable expenses, incurred by the Contractor by reason of suspension of the manufacture of plant or delay in shipment by order in writing of the purchaser or the Engineer. Unless such suspension or delay shall be due to some default on the part of the Contractor of sub-contractor.	**pervision of works**
27. The time given to the Contractor for dispatch or delivery shall be reckoned from the date of receipt by the Contractor of the order together with all necessary information and drawings, to enable the work to be put in hand. In all cases in which progress shall be delayed by strikes, lockouts, fire, accidents defective materials, delays in approval of drawings or any cause whatsoever beyond the reasonable control of the Contractor, and whether such delays or impediment shall occur before or after the time or extended time, for dispatch or delivery, a reasonable extension of time shall be granted.	**tension of time of completion**
28. If the Contractor shall fail in the due performance of his Contract within the time fixed by the Contractor any extension thereof, the Contractor agrees to accept the reduction of the Contract price by half percent per week reckoned on the contract value of such portion only of the plant as cannot in consequence of the delay be used commercially and efficiently during each week between the appointed and extended time, as the case may be and the actual time of acceptance under clause 29, and such reduction shall be full satisfaction of the Contractor's liability for delay but shall not in any case exceed 10% of the Contract value of such portion of the plant.	**Price reduction clause**
29. If the completed plant of any portion thereof, before it is taken over under clause 29, be found to bed effective or fails to fulfill the requirement of the contract, the Engineer shall give the Contractor notice setting forth particulars of such defects or failure, and the Contractor shall forth with make the defective plant good, or alter the same to make it comply with the requirements of Contract. If the Contractor fails to do so within a reasonable time, the Purchaser may reject and replace, at the cost of contractor, the whole or any portion of the plant as the case may be, which is defective or fails to fulfill the requirement of the Contract, such replacement shall be carried out by the Purchaser within a reasonable time, and at a reasonable price and where possible to same specification and under competitive conditions. In case of such replacement by the Purchaser, the Contractor shall be liable to pay to the Purchaser the extra cost, if any, of such replacement delivered and or erected as provided for in the original contract, such extra cost being the ascertained difference between the price paid by the Purchaser, under the provisions above-mentioned, for such replacement and the contract price for plant, so replaced and also to repay any sum paid by the purchaser to the Contractor in respect of such defective plant. If the purchaser does not so replace the rejected plant within a reasonable time, the Contractor shall be liable only to repay of the purchaser all moneys paid by the Purchaser to him in respect of such plant. In the event of such rejection the Purchaser shall be entitled to use of the plant in a reasonable and proper manner for a time reasonably of sufficient to enable him to obtain other replacement plant. During the period the rejected plant is used commercially, the Contractor shall be entitled to a reasonable sum as payment for such use.	**Rejection of defective plant**
30. Where the specification calls for performance test before shipment and these have been successfully carried out, the plant shall be accepted and taken over and the Engineer shall notify the Contractor to that effect. When the specification calls for tests on site the plant shall be taken over immediately after such tests have been satisfactorily carried out and the Engineer shall notify the contractor to that effect. Such notification shall not be unreasonably withheld, nor shall the Engineer delay giving such notification on account of minor omissions which	**Taking over**

does not necessarily delay shipment nor affect the commercial use of plant without any serious risk. PROVIDED ALWAYS that the Contractor undertakes to make good such omissions and defects at the earliest possible moment.	
31. For a period of 60 (Sixty months) calender months commencing immediately upon the setting to work of the plant or on 66 months from the date of receipt of equipment by the purchaser at site whichever is earlier called the "Maintenance Period", the Contractor shall remain liable to replace any defective parts that may develop in plants of his manufacture or those office of his sub-contractors approved under clause 6, under conditions provided for by the Contractor under proper use and arising, solely from faulty design, materials or workmanship, PROVIDED ALWAYS the such defective parts as are not repairable at site and are not essential in the meantime to the maintenance in commercial due of the plant are promptly returned to the Contractors' work at the expense of the Contractor unless otherwise arranged. If it becomes necessary for the contractor to replace or renew any defective part of the plant under this clause, the provisions of the first paragraph of his clause shall apply to the parts of the plant, so replaced or renewed until the expiration of six months from the date of such replacement of renewal or until the end of the above mentioned period of 60 (Sixty) months, whichever may be later. If any defect be not remedied with a reasonable time, the purchaser may proceed to do the work at the Contractor's risk and expense, but without prejudice to any other rights which the Purchaser may have against the Contractor in respect of such defects. The repaired or new parts will be delivered in accordance with clause 10. The Contractor shall bear reasonable cost of minor repair carried out on his behalf at site. At the end of maintenance period, the contractor's liabilities shall cease. In respect of goods not covered by first paragraph of this clause, the Purchaser shall be entitled to the benefit of any guarantee given to the contractor by the original supplier or manufacturer of such goods.	**Maintenance**
32. If any dispute, difference of controversy shall at any time arise between the contractor on the one hand and the MVVNL and the Engineer of the contract or the other hand the contract, or as to the true construction, meaning and intent or any part of condition of, or payment for the same, or as to the true intent, meaning interpretation, construction of effect of the clauses of the contract, specifications or drawings or any of them, or as to any thing to be done committed or suffered in pursuance of the contract or specifications, or as to the mode of carrying the contract into effect, or as to the breach or alleged breach, or as to obviating or compensating for the commission of any such breach, or as to any other matter of thing, whatsoever connected with or arising out of the contract, and whether before or during the progress or after the completion of the contract, such question difference or dispute shall be referred for adjudication to the M.D., MVVNL, Lucknow or to any other person nominated by him in this behalf and his decision in writing shall be final, binding and conclusive. This submission shall be deemed to be a submission to arbitration within the meaning of the Indian Arbitration Act, 1940 or statutory modification thereof. The Arbitrator may from time to time with consent of the parties enlarge the time for making and publishing the award. Upon every or any such reference, the costs of, an incidental to, the reference and awards respectively shall be in the discretion of the arbitrator, who shall be competent to determine the amount thereof or direct the same to betaxed as between solicitor and client or as between Parties and to direct by whom and to whom manner the same shall be borne and paid. Work under the contract shall, if reasonable possible, continue during the arbitration proceedings and no payments due to payable by the Corporation shall be with held on account of such proceedings. In case of refusal/neglect by such nominee, M.D., MVVNL may nominate another person in his place.	**Arbitration**

Any action taken or proceedings initiated on any of the terms of this agreement shall be only in the court of competent jurisdiction under the High Court of Judicature, Allahabad.	
33. The Contractor shall in all respect be construed and operate as a Contract as defined in the Indian Contract Act, 1872, and all payments there under shall be made in rupees unless otherwise specified.	**Construction of contract**
34. The marginal note to any clause of this Contract shall not affect or control the construction of such clause.	**Marginal notes**

****

Form of Agreement

This Agreement made the …… day of 2021 Between…….…….. (hereinafter referred to as "the Contractor") of the one part and The Madhyanchall Vidyut Vitran Nigam Ltd, Lucknow (hereinafter called "Purchaser") of the other part:

Whereas the Purchaser is about to erect and maintain the (hereinafter called "the works)" and for the purpose requires the plant and machinery mentioned and specified in certain general conditions, specification, schedules, drawings, form offender, covering letter and schedule of prices which, for the purpose of identification, as been signed by ---------- on behalf of the Contractor and ----------

(The Engineer or the Purchaser) on behalf of the Purchaser all of which are deemed to form part of this contract as through separately set out herein and are included in the expression "Contract" whenever herein used.

And whereas the purchaser has accepted the tender of the contractor for the supply and delivery of the said plant and machinery for the sum of ----------Upon the terms and subject to the conditions hereinafter mentioned:

NOW THESE PRESENT WITNESS and the parties hereto hereby agree and declare as follows, that is to say, in consideration of the payments to be made to the contractor by the Purchaser as hereinafter mentioned the contractor shall and will duty provide the said plant machinery for the said work on the terms and conditions mentioned in the Contract:

And in consideration of the due provisions of the said plant and machinery by Contractor and due performance of his part of the contract, the purchaser, does hereby for himself, his successors or assigns covenant with the Contractor that he, the Purchaser or his successors or assigns will pay to the contractor the said sum of or such other sums as may become payable to the Contractor under the Provisions of this Contract, such payments to be made at such time and in such manner as is provided by this contract.

In Witness whereof the parties, hereto have signed this Deed hereunder on the dates respectively mentioned against the signature of each.

Signed
By……..
(for and on behalf of the purchaser)
(Date)

In the presence of ----------

(Date)

and of ----------

(Date)

Signed
By……..
(Contractor)
(Date)

In the presence of ----------

(Date)

and of ----------

(Date)

FORM OF GUARANTEE BOND FOR SECURITY

In consideration of the Executive Engineer to Managing Director, Madhyanchal Vidyut Vitran Nigam Limited, Lucknow (hereinafter called (M.V.V.N.L.) having agreed to exempt ……..(hereinafter called 'the contractor's) from the demand under the terms and conditions of an Agreement ……..dated…….made between …….. and …… for thereinafter called, 'the agreement') of security deposit for the due fulfillment by the said Contractor (s) of the terms and conditions in the said agreement, on production of a Bank Guarantee for Rs……..
(Rupees……only). We ……..Bank Ltd. (hereinafter referred to as "the Bank") do hereby undertake to pay to the an amount not exceeding Rs. _____ against any loss or damage caused to or suffered or would be caused to or suffered by the by the reason of any breach by said Contractor(s) of any of the terms and conditions contained in the said agreement.

1. ……We ……Bank Ltd. do hereby undertake to pay the amount due and payable under this guarantee without any demur merely on demand from the MVVNL stating that the amount claimed is due by way of loss or damage caused or would be caused to or suffered by the Nigam by reason of any breach by the said Contractor of any of the terms and conditions contained in the said Agreement or by reason of the Contractors failure to perform the said agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount no exceeding to Rs. ……..

3. ……We…… Bank Ltd. further agree that the guarantee herein contained shall remain in full force, effect during the period that would be taken for the performance of the said agreement, and that it shall continue t be enforceable till all the dues of the MVVNL under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till the MVVNL or their only Authorized Officer certified that the terms and conditions of the said agreement have been fully and properly carried out by the said contractor(s) and accordingly discharges the Guarantee.

4. ……We ……Bank Ltd., further agree with the MVVNL that the MVVNL shall have the fullest liberty without our consent and without effecting in any manner of obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the MVVNL the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation on extension or extension being granted to the said Contractor(s) or for and forbearance act or commission on the part of the MVVNL or any indulgence by the MVVNL to the said contractor(s) or by any such matter or thing whatsoever which, under the law relating to sureties, would but for this provision have effect or so relating us.

5. ……We ……Bank Ltd., lastly undertake not revoke this guarantee during its currency except with the previous consent of the MVVNL in writing.

6. ……Not withstanding anything contained above, the liability of the guarantee hereunder is restricted to the said sum of Rs. ……and this guarantee shall expire on the ……day of …….. 200 ……..unless a claim under the guarantee is filed with the guarantee or within six months of such date, all claims shall lapse and the guarantor shall be discharged from the guarantee.

7. ……We ……Bank Ltd. lastly undertake to pay to the MVVNL any money so demanded notwithstanding any dispute or disputed raised by the Contractor(s) /supplier (s) is any suit or proceeding, pending before any Court or Tribunal relating to arbitration thereto or liability under this present being absolute and un-equivocal. The payment so made by us under this Bond shall be a valid discharge or our liability for payment there under and the Contractor (s) /supplier(s) shall no claims against us for making such payment.

Date _____ -days of _____ 20 _____
For _____Bank Ltd.

FORM OF BANK GUARANTEE FOR EARNEST MONEY

(For depositing earnest money in case the amount for deposit exceeds Rs. 5000/- Bank guarantee should be on a non-judicial) stamp paper of requisite value as per present Act and should be checked by the tenderer at the time of issuing the bank guarantee for any change in the stamp value)

To.

Executive Engineer to Managing Director
Madhyanchal Vidyut Vitran Nigam Ltd.,
Lucknow

Sir,

WHEREAS, M/s …….…….. a company incorporated under the Indian Companies Act, its registered office at …… a firm registered under the Indian Partnership Act and having its business office at son of---------- resident of……carrying on business under the firm's name and style of Messers……....at.....……Sri…… ……...son of……. resident of…….....……Sri…….son of……..……resident of……...partners carrying on business under the firm's name and style of Messers……at……which is unregistered partnership (hereinafter called 'The Tenderer') has/have in response to your Tender Notice against Specification No. MEDC ……. for……..offered to supply and/or execute the works as contained in the Tenderer's letter No. dated……

AND WHEREAS the Tenderer is required to furnish you a Bank Guarantee for the sum of Rs as earnest money against the tenderer's offer as aforesaid.

AND WHEREAS we……..(name of the Bank) have at the request of the tenderer agree to give you guarantee as hereinafter contained.

NOW THEREFORE, in consideration of the premises we, the undersigned, hereby convenient that the aforesaid tender of the tenderer shall remain open for acceptance by you, during the period of validity as mentioned in the tender or any extension thereof as you and tenderer may subsequently agree and if the tenderer shall, for any reason back out, whether expressly or impliedly, from his said tender during the period of its validity or any extension there of as aforesaid we hereby guarantee to you the payment of the sum of Rs……..on demand, not withstanding the existence of any dispute between the Madhyanchal Vidyut Vitran Nigam Ltd., Lucknow and the tenderer in this regard AND we hereby further agree as follows:

a) That you may without affecting this guarantee grant time or other indulgence to or negotiate further with the tenderer in regard to the conditions contained in the said tender and hereby modify these conditions or add there to any further conditions as may be mutually agreed upon between you and the tenderer.

b) That the guarantee herein before contained shall not be affected by any change in the constitution of our Bank or in the constitution of the tenderer.

c) That any account settled between you and the tenderer shall be conclusive evidence against us of the amount due hereunder and shall not be questioned by us.

d) That this guarantee commences from the date hereof and shall remain in force till the tenderer, if his tender is accepted by you, furnishes the security as required under the said specification and executes a formal agreement as therein provided or till four months after the period of validity or the extended period of validity, as the case may be of the tender, which ever is earlier.

e) Notwithstanding anything contained above the liability of the Guarantor here-under is restricted to the said sum of Rs……and this guarantee shall expire on the day of……200……..unless a claim under the guarantee is filed with the guarantor within six months of such date all claims shall lapse and the guarantor shall be discharge from the guarantee.

f) That the expressions 'The Tenderer' and 'The Bank' and 'Madhyanchal Vidyut Vitran Nigam Ltd.' herein used shall, unless such interpretation is repugnant to the subject or context, include their respective successors and assigns.

g) We ……(Name of Bank) lastly undertake to pay to the Madhyanchal Vidyut Vitran Nigam Ltd any money (so demanded notwithstanding any dispute or disputes raised by the Contractor (S) / Supplier (S) in any suit or proceeding pending before any court or Tribunal relating arbitration there to of liability under the present being absolute and unequivocal.

The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the contractor (s) / supplier (s) shall have not claim against us for making such payment.

Yours faithfully,

NOTE:- <u>The Bank guarantee should be exactly in this proforma without making any change or deletion.</u>

FORMAT OF PERFORMANCE BANK GUARANTEE

Format ***shall be followed in toto***

1. ***Claim period of six months must be kept up***
2. ***The contact details of the Issuing Bank such as Email ID, Phone No. And Fax No. Should be indicated in the PBG.***
3. ***Please note that the PBG should be forwarded to us with the covering letter of the issuing Bank from the bank confirming the signatories with signature and seal on the Bank's letter head. Otherwise, the PBG will not be considered.***
4. ***It should be typed in the Rs 100 value of stamp paper.***
5. ***It should be signed by TWO bank officials with Rubber stamp containing names & employee numbers of bank officials.***
6. ***This guarantee has to be furnished by a Nationalised Bank / Scheduled Bank Authorised by RBI to issue a Bank Guarantee***
7. ***In the case of foreign bidder the B.G may be furnished by an international reputed Bank acceptable to the PURCHASER /RBI.***
8. ***Any deviation in this format will not be acceptable.***
9. ***Please note that issuance of the PBG without meeting the above requirement will render the document invalid.***

(To be executed on Stamp Paper of Rs. 100/- or such higher value as per the Stamp Act of the State in which the Guarantee is issued. Stamp Paper should be in the name of the Bank Issuing the Guarantee.)

BANK GUARANTEE

Date:_____
Contract Name and No . :_____

To,

_____
_____

WHEREAS _____ (hereinafter called "the Supplier") which expression shall unless repugnant to the context thereof include his successors, heirs, assigns has undertaken, pursuant to Contract No. _____ dated _____, _____ to supply/works _____ (hereinafter called "the Contract").

AND WHEREAS it has been stipulated by you in the aforementioned Contract that the Supplier shall furnish you with a security _____ issued by a reputable guarantor for the sum specified therein as security for compliance with the Supplier's performance obligations in accordance with the Contract.

AND WHEREAS the undersigned _____ _____, legally domiciled in _____ _____, (hereinafter "the Guarantor") which expression shall unless repugnant to the context thereof include his successors, heirs, assigns have agreed to give the Supplier a security:

THEREFORE WE hereby affirm that we are Guarantors and responsible to you, on behalf of the Supplier, up to a total of _____ and we undertake to pay you without protest and demur, upon your first written demand declaring the Supplier to be in default under the Contract, without cavil or argument, any sum or sums within the limits of _____ _____ as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein. You shall be the sole judge for such non-fulfilment and " the Supplier " shall have no right to question such judgement.

NOW THIS DEED WITNESSETH AS FOLLOWS:

1. In pursuance of the said Contract and in consideration of the premises, the Bank hereby unconditionally and irrevocably, and without any qualification whatsoever, agrees, covenants, undertakes and guarantees, as primary obligator and not as surety merely, to make payment to Purchaser on its first demand without. whatsoever any claims, objection, protest or demur and without any recourse to the Supplier, notwithstanding any intimation or direction to the contrary or any objection, such sum or sums of money to the extent of and upto the Guaranteed Amount up to and including 6 months after the due performance of the suppliers obligation including any warranty and FMS obligations and termination of the said Contract

2. Any such demand placed on the Bank shall be conclusive as regards the Guaranteed Amount due and payable by the Bank under this Guarantee.

3. This Guarantee is executed up to and including a period of 6 months after the due performance of the supplier's obligation and termination of the said Contract during which period it is not revocable except with the previous written consent of Purchaser.

4. Purchaser may, without affecting Bank's liabilities and obligations hereunder, grant time or other indulgence to or compound with Supplies or enter into any agreement or agree to forbear to enforce any of the terms and conditions of this Guarantee.

5. This Guarantee shall not be affected by any change in the constitution of Purchaser or Supplier by merger, amalgamation or absorption with any other body or corporation or otherwise and this Guarantee will be available to or enforceable by or against such body or corporation.

In order to give effect to this Guarantee, Purchase shall be entitled to act as if the Bank were the principal debtor and the Bank hereby waives all and any of its rights of surety ship.

Any notice by way of request and demand or otherwise hereunder sent by E-mail,telex, fax or personally served, or by registered post addressed as aforesaid to the Bank in , India shall be presumed to have been duly received by the Bank as follows:

(i) If personally served, when served.
(ii) If by Email or fax or telex on the second business day after the transmission.
(iii) If mailed, upon receipt, or on seventh day after deposit in the mail with postage prepaid. The Guarantee herein contained is not revocable by notice during its currency and shall remain in full force until payment has been made to Purchase by Bank of the Guaranteed Amount payable hereunder.
(iv) Any claim/extension under the guarantee can be lodged at issuing outstation branch also become payable at our issuing outstation bank branch

Unless demand or claim under this Guarantee is received by the Bank in writing within the validity period of this Guarantee, all the rights of Purchase against the Bank shall be forfeited and the Bank shall be relieved and discharged of all liabilities hereunder.

The liability of the Bank is irrevocable during the currency of this Bank Guarantee and is restricted to the Guaranteed Amount viz. Rs _____(Rupees _____Only). and the guarantee will remain in force up to and including .....(Date) and shall be extended from time to time for such period or periods as may be desired by " the supplier" .

Unless demand or claim under this Guarantee is received by the Bank in writing within the validity and claim period of this Guarantee, all the rights of Purchase against the Bank shall be forfeited and the Bank shall be relieved and discharged of all liabilities hereunder.

These Presents shall be governed by and construed in accordance with the Indian Law, and the courts in Uttar Pradesh alone shall have exclusive jurisdiction in relation hereto.

The Bank hereby declares that it has power to issue this Guarantee and the undersigned have the full power to approve execution, delivery and the performance of the Guarantee.
This security is valid until _____ hours of the _____ day of _____, _____ with a claim period upto _____ hours of the _____ day of _____, _____.

A demand or claim under this guarantee will be received by us in writing within six months from ..... (expiry date) i.e. on or before .....(claim period end date) we shall be discharged from all liabilities under this guarantee thereafter

Name:_____
In the capacity of : _____
Signed Duly authorized to sign the security for and on behalf of: _____
Date : _____