



TRANSMISSION CORPORATION OF TELANGANA LIMITED

Website: www.tstransco.in GST No. 36AAFCT0166J1Z9 CIN No. U40102TG2014SGC094248

From:
The Chief Engineer(P&MM),
TSTransco,
Vidyut Soudha,
Hyderabad – 500 082.
Tel/Fax: 040-23303736

To
M/s. Secure Meters Limited,
E- Class, Pratap Nagar,
Industrial Area,
Udaipur- 313003,
Rajasthan, India.
Tel: 0294 2492306
Fax: 0294 2492310

SAP PO.No.4500003018/Web PO No.569-PMM/2021/CE(P&MM)/SE(P&MM)/TSPMM41-58/2020/SEMs/D.No.08/2021, Dt:17.04.2021.

Sirs,

Sub: Tender Specification No. TSPMM41-58/2020 – Supply of 13Nos. Special Energy Meters (SEMs) and 1Nos. Meter Reading Instrument(MRI)/ Data Collection Devices (DCDs) – Detailed Purchase Order – Issued – Regarding.

Ref: 1. Tender Specification No. TSPMM41-58/2020.
2. This office LOI No. CE(P&MM)/SE(P&MM)/DE41/TSPMM41-58/2020/SEMs/D.No.05/2021, Dt: 12.04.2021
3. Your Lr.No. SML/HYD/CE(P&MM)/TST/SEM/2021-22/1, dt:15.04.2021.

* * * * *

I, acting for and on behalf of and by the order and direction of TRANSMISSION CORPORATION OF TELANGANA LIMITED, accept the prices offered by you, against Tender Specification No. TSPMM41-58/2020, for supply of equipment detailed in clause (2) below, with the terms and conditions as per the Tender Specification No. TSPMM41-58/2020. This Purchase Order is issued in confirmation of the Letter of Intent issued vide ref (2) cited, accepted by you vide ref (3) cited.

2. SCOPE OF CONTRACT

This contract relates to the supply of the equipment detailed in clause (2) below and covers design, manufacture, acceptance testing before dispatch and delivery freight on road (F.O.R) destination/Stores/site within State of Telangana as detailed in this order.

3. SCHEDULE OF EQUIPMENT & PRICES:

- (a) Supply of 13Nos. Special Energy Meters (SEMs) and 1Nos. Meter Reading Instrument (MRI)/ Data Collection Devices (DCDs), conforming to the standards & specifications indicated in tender specification No. TSPMM41-58/2020 and as per the price break-up indicated below.

All Financial Figures are in Rs.

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S.No.	Description	Special Energy Meters (SEMs) Accuracy Class: 0.2S (HSN Code: 90283010)	Meter Reading Instrument (MRI) / Data Collection Device (DCD) (HSN Code: 84713090)
1	Ex-works	19,350.00	37,350.00
2	Packing & forwarding	0.00	0.00
3	Freight	70.00	120.00
4	Insurance	30.00	30.00
5	Taxable Unit Price	19,450.00	37,500.00
6	IGST @ 18% on (Ex-Works + Freight & Insurance)	3,501.00	6,750.00
7	Unit FADs Price	22,951.00	44,250.00
8	Quantity (Nos.)	13	1
9	Total FADs Price	2,98,363.00	44,250.00
10	Grand Total	3,42,613.00	
Rupees Three Lakh Forty Two Thousand Six Hundred Thirteen Only			

- (b) The equipment shall be supplied from your works at Udaipur, Rajasthan. The prices of equipment accepted above are FIRM and FOR delivery destination stores.
- (c) The dispatch of the equipment is by road only. The transit insurance shall include storage cover for 45 days at destination stores.
- (d) The prices are FIRM. The present rate of IGST @ 18% is applicable on the total of Ex-works, Freight and Insurance.
- (e) The TSTRANSCO shall have the right to vary the ordered quantity by +/- 50% at any time during the execution of the order.
- (f) The Price is inclusive of all incidental charges such as packing, forwarding, handling, unloading and other incidentals.
- (g) Freight and Insurance will be reimbursed on submission of documentary proofs only.
- (h) TCS at prevailing rates is applicable on any payment made (not applicable on ETC charges), if company's aggregate sales consideration during the relevant financial year exceeds Rs.50 Lakhs and total sales, gross receipts or total turnover including GST if any exceeds Rs.10 Crores in the financial year immediately preceding the financial year of subject sales.

The payment of TCS shall be subjected to furnishing of necessary documents. The stipulated conditions are to be verified by the DDOs while processing the bills.

The PAN No. of TS TRANSCO is AAFCT0166J.

4. **Delivery:** To complete the supply of SEMs and DCDs within two months from the date of Purchase Order.

5. **Performance Security:**

Performance security shall be furnished in the name of TSTRANSCO for an amount of 10% i.e. for **Rs. 34,261/-** (Rupees Thirty Four Thousand Two Hundred Sixty One Only) of the contract value for proper fulfillment of the contract, which will include the warranty period and completion of performance obligations including Warranty obligations. The Performance security will cover 60 days beyond the date of completion of performance obligations including Warranty obligations.

It is entirely your responsibility to extend the validity of this Bank Guarantee to cover the period of guarantee well before its expiry.

The Performance Security will be:

- a) A Bank Guarantee issued by SBI or its associate Banks / Nationalized Banks.
 - b) A banker's cheque or crossed DD or Pay Order payable at the head quarters of the Purchaser in favour of the purchaser drawn on any Schedule Bank.
6. **Guaranteed Technical Particulars:** The Guaranteed Technical Particulars shall conform to the standards mentioned in the Technical Specification.

7. **Payment:**

- a) 100% payment will be arranged through PFC/REC/Bank/TSTRANSCO/Bulk Load funds within 45 days reckoned from the check measurement date in form-13.
- b) For Real Time Gross Settlement (RTGS) the details of Bank Account of M/s. Secure Meters Limited are as follows:

(i)	Name of the Bank	IDBI Bank Ltd.,
(ii)	Branch Name	Udaipur
(iii)	Branch Address	Specialized Corporate Branch 47, 1 st Floor, Panchawati, Shaheli Marg, Udaipur, Rajasthan - 313004
(iv)	Branch Code	392
(v)	City	UDAIPUR
(vi)	Account No.	0163515014200
(vii)	MICR Code	313259003
(viii)	IFSC Code	IBKL0000392
(ix)	GST Registration No.	08AACCS8785M1ZH

- c) Applicable transaction charges will be recovered from the bill amount for each disbursement on LOA raised by unit officers.
- d) The 100% payment mentioned above is subject to submission of performance security by the supplier as per clause (5) above.

- e) The performance guarantee to be executed in accordance with this specification will be furnished on a stamp paper of value Rs.100/- within two weeks of receipt of this order as per the format indicated in Form-2 of the specification. The Bank Guarantee will be extended if required suitably in accordance with the provisions of Performance Security Clause of the Specification.
- f) If the supplier has received any over payments by oversight or if any amounts are due to the TSTransco due to any other reasons, when it is not possible to recover such amounts under the contract resulting out of this specification, TSTransco reserves the right to collect the same from any other amount due to the supplier and / or Bank Guarantees given by the company due to or with TSTransco.
- g) When the supplier does not at any time, fulfill his obligations in replacing / rectifying etc. the damaged / defective materials in part or whole promptly to the satisfaction of the TSTransco Officers, TSTransco reserves the right not to accept the bills against subsequent dispatches made by the supplier and only the supplier will be responsible for any demurrages, wharfages or damage occurring to the consignments so dispatched.
- h) Any incidental charge such as stamp duty, bank charges etc., shall be to the Supplier's account and any charges in relation there to shall not be included in the bills submitted to TSTransco.
- i) All payments will be made in non-convertible Indian Rupees.

8. RESPONSIBILITY OF THE SUPPLIER FOR LOSS/DAMAGE

- (a) The supplier is responsible for the safe delivery of the goods in good condition at the destination. He should acquaint himself of the conditions obtaining for handling and transport of the goods to destination and shall include and provide for security and protective packing of the goods so as to avoid damage in transit.
- (b) External damages or shortages that are prima facie the results of rough handling in transit or due to defective packing will be intimated within a fortnight of the receipt of the materials. Internal defects, damages or shortages of any internal parts which cannot ordinarily be detected on a superficial visual examination will be intimated subsequently. In either case, the defective or damaged materials should be replaced by the supplier free of cost to the TSTRANSCO. If no steps are taken within 15 days of receipt of intimation of defects or such other reasonable time as the TSTRANSCO may deem proper to afford, TSTRANSCO may without prejudice to its other rights and remedies cause to be repaired or rectified the defective material or replace the same and recover the expenditure incurred there for from the deposit such as Earnest Money, Security and Performance or other monies available with TSTRANSCO or by resorting to legal action.

- (c) For the purpose of any legal consideration, the material shall be deemed to pass into TSTRANSCO's ownership only at the final destination where they are delivered and accepted.

9. Penalty for Late Delivery:

- a) The delivery period as per agreed delivery schedule shall be deemed to be the essence of the contract. In case of delay in delivery of materials beyond the agreed delivery schedule or to perform the services within the period specified in the contract whatever be the reason the TSTRANSCO may at its option, demand and recover from the supplier from the contract price, as liquidated damages, a sum equivalent to 0.5% per week on the undelivered portion subject to a maximum of 5% of total value of contract.
- b) For penalty, the number of days of delay would be rounded off to the nearest week and penalty calculated accordingly.
- c) Equipment which is not of acceptable quality (or) not confirming to specification would be deemed to be not delivered.
- d) The penalty specified will be levied and would be adjusted against subsequent pending bills.
- e) The check measurement date in Form-13 i.e., the date of receipt of equipment at the destination stores in good condition will be taken as date of delivery.

10. Force Majeure:

- (a) The Supplier will not be liable for forfeiture of its performance security, penalty for late delivery or termination for default if and to the extent that it's delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.
- (b) For the purpose of this clause 'Force Majeure' means an event beyond the control of the Supplier and not involving the Suppliers' fault or negligence and not foreseeable. Such events may include but are not restricted to wars or revolutions, fires, floods, epidemics, earth quakes, Tsunami, quarantine restrictions and freight embargoes.
- (c) If the Force Majeure situation arises, the supplier will promptly notify the Purchaser in writing of such condition and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier will continue to perform its obligations under the Contract as far as is reasonably possible, and will seek all reasonable alternative means for performance not prevented by the Force Majeure event.

11. Termination for Default:

- (a) The Purchaser without prejudice to any other remedy for breach of Contract, by written notices of default sent to the Supplier, may terminate this Contract in whole or part :
 - i) If the Supplier fails to deliver any or all of the Materials/equipment within the period(s) specified in the Contract, or within any extension thereof granted by the Purchaser.
 - ii) If the Supplier fails to perform any other obligation(s) under the Contract.
 - iii) If the Supplier, in the judgment of the Purchaser has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.
- (b) 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, Materials/equipment or services similar to those undelivered and the Supplier will be liable to the Purchaser for any excess costs for such similar Materials/equipment or Services. However, the Supplier will continue performance of the Contract to the extent not terminated.

12. Termination for convenience:

- (i) The Purchaser, by written notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination will specify the termination is for the Purchaser's convenience, the extent to which performance of the supplier under the Contract is terminated, and date upon which termination becomes effective.
- (ii) However the Materials / equipment that are complete and ready for shipment within thirty (30) days after the supplier's receipt of notice of termination will be accepted by the Purchaser at the Contract terms and prices.

13. Warranty:

The meters should be guaranteed for satisfactory operation for a minimum period of 5 years from the check measurement date in Form-13 i.e., from the date of receipt of material at destination stores by the consignee in good condition. During the guarantee period if the meter while in its normal operation is found defective, it shall be replaced / repaired by the supplier with a new meter free of cost within 30 days. In the event of any corrections of defects or replacement of defective material during the warranty period, the warranty for the corrected / replaced material shall be extended by a further period of 12 months.

For the purpose of ensuring 5 years guarantee, meter may be sealed at manufacturer's premises after inspection by the TSTRANSCO representative and dispatched in sealed condition.

14. Taxes:

Taxes as indicated in the price schedule at para (2) are applicable. You shall agree, that if, at any time, any GST reported to have been paid has not been paid, or a lesser amount has been paid, or on subsequent adjudication or appeal or revision it is decided that a lesser amount is payable, you shall refund such amounts irrespective of time lag.

15. Statutory Variations:

Any variation up or down in statutory levy or new levies introduced after signing of the contract under this specification will be to the account of TSTRANSCO, provided that in cases where delivery schedule is not adhered to by the supplier and there are upward variation/ revision after the agreed delivered date, the supplier will bear the impact of such levies and if there is downward variation / revision the TSTRANSCO will be given credit to that extent.

Statutory variation if any allowed, it is allowed only once during delivery period, i.e. at the time of delivery of goods at factory.

In case of sub-vendor items, taxes & duties are inclusive in tender price and no statutory variation is applicable.

In cases where the bidder assumes less tax rates and become lowest, upward variation of taxes will not be considered. In case of the bought out items for which the prices are quoted all inclusive of taxes, statutory variation shall not be applicable

16. Inspection:

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

The supplier shall keep the purchaser informed in advance, about the manufacturing program so that arrangement can be made for inspection.

The purchaser reserves the right to insist for witnessing the routine testing of the bought out items. The supplier shall give 15 days for local supply/30 days (in case of foreign supply) advance intimation to enable the purchaser to depute his representative for witnessing the acceptance and routine tests.

Supplier shall have to get Acceptance tests as per the requirement of relevant standards on all (100% quantity) Energy meters without any additional cost to TSTRANSCO at NABL accredited laboratory or at Manufacturer's factory if manufacturer have NABL accreditation in the presence of purchaser's representative.

Material shall be dispatched only after approval of these test reports and granting of dispatch clearance. After completion of Type testing and acceptance by TSTransco payment for the delivered consignment against dispatch instructions of the Lot will be made."

17. Tests:

Each Energy Meter shall be subjected to the following acceptance tests:

- i) Verification of compliance with Table 4 under clause 8.1 of IEC-62053-22:2003, in both directions of power flow, for class 0.2S.
- ii) Test of the register ratio and the impulse value of the transmitting device, for both directions.
- iii) Verification that VARh measurement errors are within values permitted for class 2 in Table 6 of IEC 62053-23 for both directions of power flow.
- iv) Effect of +10% variation in measuring circuit voltage, on accuracy of Wh and VARh measurement
- v) Power loss.
- vi) Dielectric properties.
- vii) Starting and running with no-load for Wh and VARh, in both directions.
- viii) Functional checks for display and memory.
- ix) Accuracy of the calendar and clock.
- x) Accuracy of voltage and frequency measurement.

Acceptance Tests for DCDs:

All DCDs, after final assembly and before dispatch from Contractor's/Manufacturer's works shall be duly tested to verify that they are suitable for supply to the Purchaser. In particular, each and every DCD shall be subjected to the following acceptance test:

- i) Functional checks
- ii) Downloading Meter Data from the Meter(s)
- iii) Compatibility with PC Software
- iv) Downloading the meter data on PC
- v) Functioning of advance and retard time commands
- vi) Per meter downloading time verification
- vii) Capacity of DCD for data storage

Type Tests

One (1) out of ordered quantity of meters shall be subjected to the complete range of type tests as per IEC-62053-22:2003, IEC-62053-23:2003 and IEC 62052- 11:2003, after final assembly. In case of any failure to pass all specified tests, the contractor shall arrange to carry out the requisite modifications/replacements in the entire lot of meters at his own cost. After any such modifications and final assembly, two (2) meters selected out of the lot by the Owner's representative shall be subjected to the full range of type tests. The lot shall be accepted by the Owner only after successful type testing.

The meters used for type testing shall be separately identified, duly marked, and supplied to the Owner in case they are fully functional and as good as other (new) meters, after necessary touching up/refurbishing. In case this is not possible, the contractor shall provide their replacements at no extra cost to Owner.

18. Dispatch Instructions:

The dispatch instructions for the equipment will be furnished separately on satisfactory scrutiny of type/acceptance test certificates. The prices indicated in clause (3) above shall remain unaltered whatever be the destination.

19. Contract Drawings:

Three sets of the detailed drawings/GTP along with soft copy of the equipment ordered giving full particulars of sectional views to give a clear idea of construction and working of the equipment shall be furnished for approval. Approval by TSTRANSCO to the supplier's drawings shall not relieve the supplier of his responsibility for correctness thereof or from results arising out of error or omission therein or from any obligation or liability under the contract. Any supplementary drawings necessary to permit the complete design of the installation prior to receiving the equipment shall also be supplied. Within two weeks of approval, six sets of all approved drawings and soft copy of drawings shall be furnished.

One set of drawings and instruction manuals along with soft copy shall be sent along with each equipment at the time of dispatch. Copies of the drawings and manuals shall also be sent to other offices as indicated below.

Consignee : One set of approved drawings per consignee
Two Sets : Concerned Executive Engineer
To this office : Six sets.

20. Completeness of Contract:

All minor accessories that are normally necessary for satisfactory and efficient operation of the equipment shall be supplied by you free of cost to the TSTRANSCO whether these are specifically mentioned or not in the specification, your tender schedules or in this purchase order and the equipment shall be complete in itself.

21. General Conditions of Contract:

Except in so far as it is provided otherwise in this contract, you shall abide by the terms and conditions appended to the specification. Except as specifically accepted in this order the terms and conditions mentioned in your quotation under reference are not accepted.

22. Risk:

The risk in the property is entirely yours till the goods are received in good condition at the destination.

23. Packing:

Each item shall be securely packed separately in such a manner as to withstand rough handling during rail and road transit upto site and as per latest IS/BSS/IEC.

24. Material & Workmanship:

All the materials shall be of the best class and shall be capable of satisfactory operation in the tropics under service conditions without distortion or deterioration. No welding or filling or plugging of defective parts shall be permitted, unless otherwise specified they shall conform to the requirement of the appropriate Indian, British or American standards (where a standard specification covering the material in question has not been published the standards of the American society for testing of materials should be followed).

The entire design and construction shall be capable of withstanding the several stresses likely to occur in actual services and of resisting rough handling during transport.

25. Insurance:

As insurance charges are included in your prices (clause 3(a)) you should cover the equipment against transit risks and also for further period of 45 days towards storage from the date of receipt of equipment at site. It is entirely your responsibility for arranging the

insurance through your underwriters. The damages and shortages will be intimated to you as stipulated in purchase order and you shall arrange for replacement/repairs immediately without awaiting settlement from insurance authorities.

Note: The material will not be taken into stock unless documentary evidence for Freight and Insurance is furnished along with material.

26. Interchangeability:

All similar equipment and removable parts of similar equipment shall be interchangeable with each other.

27. Spares:

You shall supply any spares required for the equipment that will be supplied under this order, whenever called upon to do so at fair prices and at the TSTRANSCO's standard terms of payment within a period not exceeding the deliveries accepted therein.

28. Progress Reports:

You shall furnish the program of works and progress reports on the manufacture of equipment to this office every month in triplicate till the supplies are completed.

29. Correspondence:

- a) Your acknowledgement of this order and all correspondence of general or technical nature shall be addressed to the Chief Engineer/P&MM, TSTransco, Vidyut Soudha, Hyderabad –500 082.
- b) All correspondence regarding dispatches, payments and any other field matters shall be addressed to the concerned paying officer. Copies of such correspondence shall be marked to the concerned Superintending Engineer and to the Chief Engineer/P&MM, TSTransco, Vidyut Soudha, Hyderabad –500 082. Copies of the correspondence regarding payments should also be marked to the Executive Director/Finance, TSTransco, Vidyut Soudha, Hyderabad –500 082.
- c) You shall submit invoices for materials directly to the paying officer.

30. Jurisdiction:

All and any disputes or differences arising out of or touching this order shall be decided only by courts or tribunals situated in Hyderabad or Secunderabad cities. No suit or other legal proceedings shall be instituted elsewhere.

31. Supervision of Erection, testing and commissioning:

You have to provide services of qualified personnel for supervision of erection, testing at site and commissioning of these Energy Meters and DCDs wherever required. The above services should be provided at free of Cost.

32. Acknowledgement:

Please acknowledge the receipt of this purchase order with your confirmation of its acceptance by you and the extra copy enclosed may please be returned with your signature in token of your acceptance.

Encl.: Technical Specification.

Yours faithfully,

SD/-

Chief Engineer/P&MM

(Acting for and on behalf of TSTRANSCO)

WE ACCEPT THE TERMS AND CONDITIONS OF THIS PURCHASE ORDER

**SIGNATURE OF THE CONTRACTOR
WITH SEAL AND DATE**

Copies to:

The Executive Director/Finance/TSTransco/Vidyut Soudha/Hyderabad.

The Chief Engineer/Transmission/TSTransco/Vidyut Soudha/Hyderabad.*

The Chief Engineer/400kV/TSTransco/Vidyut Soudha/Hyderabad.

The Superintending Engineer/Quality Control/ TSTransco/Vidyut Soudha/Hyderabad.

The Superintending Engineer/EBC/TSTransco/Vidyut Soudha/Hyderabad.

The Superintending Engineer/Transmission/TSTransco/Vidyut Soudha/Hyderabad.

The Superintending Engineer/OMC/Metro-Central/TSTransco/2nd Floor, 132kV NIMS GIS SS premises/Erramanzil/Panjagutta/Hyderabad -82

The SAO/Pay & accounts/TSTransco/Vidyut Soudha/Hyderabad along with Form-40.

The SAO/Metro-Central/TSTransco/2nd Floor, 132kV NIMS GIS SS premises/ Erramanzil/ Panjagutta/Hyderabad -82.

The Divisional Engineer/Transmission & Stores/Metro/Erragadda/ Hyderabad, 500 045.

The AEE/Construction Stores/TSTransco/Erragadda/Hyderabad.

* Copy of this PO is available on <http://www.tstransco.in/>

This order is placed against the indents indicated below:

Sl. No.	Indent Reference	SEMs (Qty in Nos.)	MRI/DCD (Qty in Nos.)	Required for
1	U.O. No. CE/400kV/SE-I/D3-A2/ F.NTPC/D.No.347/2020, Dt: 17.11.2020.	13	1	Interstate feeders of AP – Telangana.

* Copy of this PO is available on <http://www.tstransco.in/>

TECHNICAL SPECIFICATION FOR SPECIAL ENERGY METERS AND DATA COLLECTING DEVICES

- 1.0 The energy metering system specified herein shall be used for tariff metering for bulk, inter-utility power flows, in different Regions of India. One static type composite meter shall be installed for each EHV circuit, as a self-contained device for measurement of active energy (MWh) transmittals in each successive 15 minute block and certain other functions, as described in the following paragraphs.
- 2.0 The meters shall be suitable for being connected directly to voltage transformers (VTs) having a rated secondary line-to-line Voltage of 110V, and to current transformers (CTs) having a rated secondary current of 1A. Any further transformers/transactions/transducers required for their functioning shall be in-built in the meters. Necessary isolation and/or suppression shall also be built-in, for protecting the meters from surges and voltage spikes that occur in the VT and CT circuits of extra high voltage switchyards. The reference frequency shall be 50Hz.
- 3.0 The active energy (Wh) measurement shall be carried out on 3-phase, 4-wire principle, with an accuracy as per class 0.2 S of IEC-62053-22:2003. The energy shall be computed directly in CT and VT secondary quantities, and indicated in watt-hours. The meter shall compute the net active energy (Wh) sent out from the substation bus bars during each successive 15- minutes block, and store it in its memory along with plus/minus sign. It shall also display on demand the net Wh sent out during the previous 15-minute block, with a minus sign if there is net Wh export.
- 4.0 Further, the meter shall continuously integrate and display on demand the net cumulative active energy sent out from the substation bus bars up to that time. The cumulative Wh reading at each midnight shall be stored in the meter's memory. The register shall move backwards when active power flows back to substation bus bars.
- 5.0 The Special Energy Meters are required for measuring step change of 0.01 Hz in the frequency band 49.50 — 50.50 Hz. The meter shall count the number of cycles in VT output during each successive 15-minutes block, and divide the same by 900 to arrive at the average frequency. This shall be stored in the meter's memory as a 2-digit code which shall be arrived at by subtracting 49.5 from the average frequency, multiplying by 100 and neglecting all decimals. For example, 49.89 Hz shall be recorded as 39. In case the average frequency is less than or equal to 49.50 Hz, it shall be recorded as 00. In case it is 50.49 Hz or higher, it shall be recorded as 99. The average frequency of the previous 15-minutes block shall also be displayed, on demand in hertz.

- 6.0 The meter shall continuously compute the average of the RMS values of the three line-to-neutral VT secondary voltages as a percentage of 63.51 V, and display the same on demand. The accuracy of the voltage measurement/computation shall be at least 0.5%, a better accuracy such as 0.2% in the 95-105% range being desirable.
- 7.0 The meter shall also compute the reactive power (VAR) on 3-phase, 4-wire principle, with an accuracy as specified in clause 11.0, and integrate the reactive energy (VARh) algebraically into two separate registers, one for the period for which the average RMS voltage is 103.0% or higher, and the other for the period for which the average RMS voltage is below 97.0%. The current reactive power (VAR), with a minus sign if negative, and cumulative reactive energy (VARh) readings of the two registers shall be displayed on demand. The readings of the two registers at each midnight shall also be stored in the meter's memory. The reactive power and reactive energy transmittals shall be computed in VAR/VARh directly calculated in CT and VT secondary quantities. When lagging reactive power is being sent out from substation bus bars, VAR display shall have a plus sign or no sign and VARh registers shall move forward. When reactive power flow is in the reverse direction, VAR display shall have negative sign and VARh registers shall move backwards.
- 8.0 **Deleted.**
- 9.0 The meters shall fully comply with all stipulations in IEC standards 62052-11:2003 and 62053-22:2003, except those specifically modified by this specification. The reference ambient temperature shall be 30° C.
- 10.0 Errors shall be reasonable for all power factor angles from 0° to 360°
- 11.0 For reactive power (VAR) and reactive energy (VARh) measurements, IEC 62053- 23:2003 shall be complied with. The accuracy of measurement of reactive energy shall be as per class 2.
- 12.0 Each meter shall have a test output device (visual) for checking the accuracy of active energy (Wh) measurement. The preferred pulsing rate is twenty (20) per Wh for Model-A. It shall be possible to couple this device to suitable testing equipment also.
- 13.0 No rounding off to the next higher last decimal shall be done for voltage and frequency displays. All 15 minute Wh figures shall however be rounded off to the nearest last decimal.

- 14.0 The three line-to-neutral voltage shall be continuously monitored and in case any of these falls below about 70%, a normally flashing lamp provided on meter's front shall become steady. It shall go off if all three voltages fall below 70%. The time blocks in which such a voltage failure occurs/persists shall also be recorded in the meter's memory. The lamp shall automatically resume flashing when all VT secondary voltages are healthy again. The two VARh registers specified in clause 7.0 shall remain stay-put while VT supply is unhealthy.
- 15.0 The meters shall normally operate with the power drawn from the VT secondary circuits. The total burden imposed by a meter for measurement and operation shall not exceed 10 VA on any of the phases. An automatic backup for continued operation of the meter's calendar-clock, and for retaining all data stored in its memory, shall be provided through a long-life battery, which shall be capable of supplying the required power for at least 2 years. The meters shall be supplied duly fitted with the batteries, which shall not require to be changed for at least 10 years, as long as total VT supply interruption does not exceed two years. The battery mounting shall be designed to facilitate easy battery replacement without affecting PCB of the meter. The meters shall not require any separate auxiliary supply for their operation. All displays may disappear on loss of VT supply.
- 16.0 Each meter shall have a built-in calendar and clock, having an accuracy of 30 seconds per month or better. The calendar and clock shall be correctly set at the manufacturer's works. The date (year-month-day) and time (hour-min.-sec.) shall be displayed on the meter front (when VT supply has been connected), on demand. Only limited clock adjustment shall be possible at site, using the DCD. When an advance or retard command is given, six subsequent time blocks shall be contracted or elongated by ten seconds each. The meter shall not accept another clock correction command for seven days. All clock corrections shall be registered in the meter's memory and suitably shown on print out of collected data.
- 17.0 Each meter shall have a unique identification code, which shall be marked permanently on its front, as well as in its memory. All meters supplied to TSTRANSCO as per this specification shall have their identification code starting with "TS", which shall not be used for any other supplies. "TS" shall be followed by a dash and a four digit running serial number, further followed by a dash and "A" for the use with CT secondaries of 1A.
- 18.0 Each meter shall have at least one seven (7)-character, seven-segment electronic display, for indication of the following (one at a time), on demand:
- i) Processor's identification code and model : TS-1234-A

- ii) Date (year month day) : 910329 d
 - iii) Time (hour min. sec.) : 195527t
 - iv) Cumulative Wh reading : 12345.6 C
 - v) Average frequency of the previous block : 49.89 F
 - vi) Net Wh transmittal during the previous block: - 28.75 E
 - vii) Average % voltage : 99.2 U
 - viii) Reactive power (VAR) : 106.5 r
 - ix) Voltage - high VARh register reading : 01234.5 H
 - x) Voltage - low VARh register reading : 00123.4L
 - xi) Low battery indication
- 19.0 A gold plated touch key or push button shall be provided on the meter front for switching on the display and for changing from one indication to the next. (The display shall switch off automatically about one minute after the last operation of touch key/push button). When the display is switched on, the parameter last displayed shall be displayed again, duly updated.
- 20.0 Each meter shall have a non-volatile memory in which the following shall be automatically stored:
- i) Average frequency for each successive 15-minute block, as a 2-digit code
 - ii) Net Wh transmittal during each successive‘ 15-minute block, upto second decimal, with plus/minus sign
 - iii) Cumulative Wh transmittal at each midnight, in six digits including one decimal
 - iv) Cumulative VARh transmittal for voltage high condition, at each midnight in six digits including one decimal
 - v) Cumulative VARh transmittal for voltage low condition, at each midnight, in six digits including one decimal
 - vi) Date and time blocks of failure of VT supply on any phase, as a star (*) mark.
- 21.0 The meters shall store all the above listed data in their memories for a period of ten(10) days. The data older than ten (10) days shall get erased automatically.

22.0 Each meter shall have an optical port on its front for tapping all data stored in its memory. Portable or hand held data collection devices shall also be separately provided for this purpose, one for each substation, to serve as the interface between the meters specified above and the local personal computer (PC). In addition to above each meter shall be provided with a RS-485 port on one of it's sides, from where all the data stored in the meter's memory can also be tapped. The overall intention is to tap the data stored in the meter's memories once a week from any of the two ports mentioned above and transmit the same to a remote central computer using STD or other communication links, through the local PC. It shall also be possible to obtain a print out (hard copy) of all data collected from the meters, using the local PC.

23.0 The whole system shall be such as to provide a print out (both from the local PC, and from remote central computer) of the following form:

	55	+16.28	56	+15.95	55	+15.32	54	+15.66
23	55	+14.93	55	+14.26	54	+14.85	56	+15.17
NP-1234-A	12345.6		01234.5		00123.4		91-03-29	
	57	+14.72	56	+13.83	55	+13.57	53	+12.91
01	52	+13.34	51	+12.76	52	+14.11	52	+15.28

24.0 The meters shall be supplied housed in compact and sturdy, metallic or moulded cases of non-rusting construction and/or finish. The cases shall be designed for simple mounting on a plane, vertical surface such as a control/relay panel front. All terminals for CT and VT connections shall be arranged in a row along the meter's lower side. Terminals shall have a suitable construction with barriers and cover, to provide a secure and safe connection of CTs and VTs leads through stranded copper conductors of 2.5 sq. mm. size.

25.0 All meters of the same model shall be totally identical in all respects except for their unique identification codes. They shall also be totally sealed and tamper proof, with no possibility of any adjustment at site, except for clock correction.

26.0 The meters shall safely withstand the usual fluctuations arising during faults etc. In particular, VT secondary voltages 115% of rated applied continuously and 190% of rated for 3.0 seconds, and CT secondary current 150% of rated applied continuously and 30 times of rated applied for 0.5 seconds shall not cause any damage to or mal operation of the meters.

- 27.0 The meters shall also withstand without any damage or mal operation reasonable mechanical shocks, earthquake forces, ambient temperature variations, relative humidity etc. They shall have an IP-51 category dust-tight construction, and shall be capable of satisfactory operation in an indoor, non-air conditioned installation.
- 28.0 The meters shall continue to function for the remaining healthy phase(s), in case one or two phases of VT supply fails. In case of a complete VT supply failure, the computation of average frequency (as per 5.0) shall be done only for the period during which the VT supply was available in the 15-minute block. Any time block contraction or elongation for clock correction shall also be duly accounted for.
- 29.0 The harmonics shall preferably be filtered out while measuring Th, VAR and VARh, and only fundamental frequency quantities shall be measured/computed.
- 30.0 Either the meters shall have built-in facility (eg. test links in their terminals) for in- situ testing, or a separate test block shall be provided for each meter.
- 31.0 **Portable/hand-held Data Collection Devices (DCD) :**
- These shall be tailor-made for tapping all data stored in a meter's memory, and faithfully transferring it to the local PC. Each device shall be supplied complete with**
- i) a lead with optical head for coupling it to the meter,
 - ii) a lead for plugging it to a personal computer;
 - iii) an internal battery for powering the devices;
 - iv) a case for safely carrying it about
 - v) a battery charger
- The total arrangement shall be such that one (1) operation can carry out the whole operation himself, in about five (5) minutes per meter.**
- 32.0 The DCD shall have a key for starting the data tapping from the coupled meter's memory, a key to start data transfer to the PC, and a lamp, which would light up on completion of data collection, remain 'on' while the data is held in the device and would go 'off' when all data has been transferred to the PC. Data tapping operation shall not erase the data from the meter's memory, or effect the meter operation in any way. The memory of the DCD shall get automatically cleared when the data has been transferred to the PC only then the DCD shall accept data from another meter. DCDs shall also have necessary provision for meter clock correction. DCDs shall be compatible with earlier supplied meters of L&T/SML make in regard to data downloading etc.

- 33.0 The Contractor shall provide the necessary software which would enable a local IBM-Compatible PC to (i) accept the data from the DCD and/or from a interface device connected to the optical port/RS-485 port and store it in it's memory in binary read only format in an user-defined filename (filename format must be **ddmmsubstation** name-utility name), (ii) Polling feature along with a task scheduler to run the data downloading software at a pre-designated date and time repeatedly or by manually selecting a meter. File naming for such downloaded data should also be in user-defined format. A detailed activity log shall also be available for each downloading operation, (iii) upload/import meter data(binary files) in the software for further processing. While uploading, there shall be provision to upload all selected files with single key-stroke, (iv) convert the binary file(s) to text file(s). there should be provision to select multiple files based on file name, convert all selected files with single key-stroke and store the text files in the same location where binary files are stored, (v) display the collected data on PC's screen in text format, with forward/backward rolling, (iv) print out in text format the data collected from one or more meters, starting from a certain date and time, as per operator's instructions, (v) transmit the collected data, in binary format, through an appropriate communication link to the central computer, starting from a certain date and time, as per operator's instructions, and (vi) store the collected data ,in binary format, on a floppy disc/CD/Pen Device .
- 34.0 The above software shall further ensure that absolutely no tampering (except total erasures) of the collected metering data is possible during its handling by the PC. The software shall be suitable for the commonly available PCs, and shall be supplied to Owner in a compatible form to enable its easy loading into the PCs available (or to be installed by the Owner/others) at the various substations.

35.0 **Quality Assurance**

The quality control procedure to be adopted during manufacture of the specified equipment shall be mutually discussed and finalized in due course, generally based on the established and proven practices of the manufacturer.

36.0 **Testing**

All equipment, after final assembly and before dispatch from manufacturer's works, shall be duly tested to verify that is suitable for supply to the Owner. In particular, each and every meter shall be subjected to the following acceptance tests:

- i) Verification of compliance with Table 4 under clause 8.1 of IEC-62053-22:2003, in both directions of power flow, for class 0.2S.

- ii) Test of the register ratio and the impulse value of the transmitting device, for both directions.
- iii) Verification that VARh measurement errors are within values permitted for class 2 in Table 6 of IEC 62053-23 for both directions of power flow.
- iv) Effect of +10% variation in measuring circuit voltage, on accuracy of Wh and VARh measurement
- v) Power loss.
- vi) Dielectric properties.
- vii) Starting and running with no-load for Wh and VARh, in both directions.
- viii) Functional checks for display and memory.
- ix) Accuracy of the calendar and clock.
- x) Accuracy of voltage and frequency measurement.

37.0 Any meter which fails to fully comply with the specification requirements shall be liable to be rejected by the Owner. However, the Owner may purchase such meters at a reduced price in case of marginal non-compliance, at his sole discretion.

38.0 **Acceptance Tests for DCD and PC Software**

All DCDs, after final assembly and before dispatch from Contractor's/Manufacturer's works shall be duly tested to verify that they are suitable for supply to the Purchaser. In particular, each and every DCD shall be subjected to the following acceptance test:

- i) Functional checks
- ii) Downloading Meter Data from the Meter(s)
- iii) Compatibility with PC Software
- iv) Downloading the meter data on PC
- v) Functioning of advance and retard time commands
- vi) Per meter downloading time verification
- vii) Capacity of DCD for data storage

39.0 **Type Tests**

One (1) out of tendered quantity of meters shall be subjected to the complete range of type tests as per IEC-62053-22:2003, IEC-62053-23:2003 and IEC 62052- 11:2003, after final assembly. In case of any failure to pass all specified tests, the contractor shall arrange to carry out the requisite modifications/replacements in the entire lot of meters at his own cost. After any such modifications and final assembly, two (2)

meters selected out of the lot by the Owner's representative shall be subjected to the full range of type tests. The lot shall be accepted by the Owner only after successful type testing.

- 40.0 The meters used for type testing shall be separately identified, duly marked, and supplied to the Owner in case they are fully functional and as good as other (new) meters, after necessary touching up/refurbishing. In case this is not possible, the contractor shall provide their replacements at no extra cost to Owner.
- 41.0 The Contractor shall arrange all type testing specified above, and bear all expenses for the same.
- 42.0 Following technical information shall be furnished by the Bidders in their offers:
- i) Foreseen dimensions of proposed meter.
 - ii) Expected weight of proposed meter.
 - iii) Foreseen dimensions of DCD.
 - iv) Expected weight of DCD
 - v) Dimensions and weight of the test block, if supplied separately.

SD/-
Chief Engineer/P&MM