

MAHARASHTRA STATE ELECTRICITY DISTRIBUTION COMPANY LTD.

TECHNICAL SPECIFICATION FOR HT STATIC TRI-VECTOR TOD METER

SPECIFICATION NO: DIST /MM-IV/14 Dt.11.06.2008.

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(HTSTATMET \ SPECTODMET \ :05/05)

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1.0 SCOPE:

This specification covers design, manufacture, testing, supply and delivery of ISI mark HT STATIC Tri-Vector Meters, required for H.T. Consumers` Installations. Meters shall be suitable for measurement of energy and power demand as per power tariff requirement of A.C. balanced / unbalanced loads. The original manufacturer of HT STATIC Tri-Vector Meters, shall only quote against this tender. In case of Foreign Manufacturer, the authorised Agents /Traders/Distributors may also bid, provided they have all the testing facilities in India and meters bear ISI mark.

2.0 QUALIFYING REQUIREMENTS:-

- 2.1 I] Offers of only original manufacturers of L.T.A.C. Static Energy Meters shall be accepted against the Tender.
- II] The following qualifying requirement shall be fulfilled by the bidders/manufacturers
- a) The bidder/manufacturer should have turnover of Rs.80 crores during any one of the last three financial years.
 - b) The bidder/manufacturer should have supplied 12.5 lakhs static meters during the last three financial years.
 - c) The bidder/manufacturer should have minimum experience of three years of supply or manufacturing for static meters upto the end of the last financial year.
- III] The offers of Indian subsidiary company, whose parent company is located abroad fulfilling the qualifying requirements shall be considered provided the Indian participant subsidiary company fulfils the minimum experience of three years of supply or manufacturing for static energy meters upto the end of the last financial year. However, the conditions of turnover of Rs.80 crores during any one of the last three financial years and supply of minimum quantity of 12.5 lakhs static energy meters during last three financial years can be fulfilled by the parent company located in abroad on behalf of their Indian subsidiary company. The parent company shall furnish undertaking for accepting responsibility for supplying quality meters as per specifications and execution of the contract on behalf of its India based subsidiary unit who has participated in the tender in Annexure U-I.
- IV] In case of offers of Foreign bidders/manufacturers, they shall fulfill Qualifying Requirement as per Sr. No. 2.1 [I] and 2.1 [II] above.

3.0 SERVICE CONDITIONS:

The meters to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions

3.1 Environmental Condition

a) Maximum ambient temperature	55 °C
b) Maximum ambient temperature in shade	45 °C
c) Minimum temperature of air in shade	35 °C
d) Maximum daily average temperature	40 °C
e) Maximum yearly weighted average temperature	32 °C
f) Relative Humidity (%)	10 to 95
g) Maximum Annual rainfall (mm)	1450
h) Maximum wind pressure (Kg/m.sq)	150
i) Maximum altitude above mean sea level (meters)	1000
j) Isoceraunic level (days/year)	50
k) Seismic level (Horizontal acceleration)	0.3g
l) Climate:- Moderately hot and humid tropical climate	

conducive to rust and fungus growth.

4.0 APPLICABLE STANDARDS:

- The Meter should conform to requirements of **IS:14697/1999**(amended up to date) and other relevant IS specifications including CBIP Tech-Report-88 amended up to date. The specifications given in this document supersedes the relevant clauses of IS: 14697/1999(amended up to date) wherever applicable.
- The meter shall bear ISI Mark.
- The class of accuracy shall be 0.5S.

4.1 Current & Voltage rating

> Type of Service: H.T. Tri-Vector meter combined with KVA Demand shall be suitable for use on 3 phase 4 wire system .The connection diagrams for this system shall be provided on terminal cover.

> P.T. Secondary Voltage... 63.5 Volts Ph-N

> Rated voltage shall be 3 * 63.5 Volts. The voltage range shall be +15% to – 30% of rated voltage.

Meter shall be programmed for P.T. ratio 11 kV/ $\sqrt{3}$ /110 V/ $\sqrt{3}$.

- > The secondary current of C.T. shall be either 5 Amps or 1 Amp.
Meter shall be programmed for C.T. ratio of 5/5 or 1/1 Amp respectively.
- > Rated basic current for meter shall be either 5 Amps or 1 Amp as per the need, however the exact rating i.e.1 or 5 A will be informed at the time of issue of the purchase order.
- > The maximum continuous current of the meter is 2 times (200 %) of Ib. The starting current for the meter should be 0.1% of Ib.

4.2 Temperature

The standard reference temperature for performance shall be 27⁰C. The mean temperature co-efficient should not exceed 0.03%.

4.3 Frequency

The rated frequency shall be 50 Hz \pm 5%.

4.4 Power Factor

Power Factor range - Zero Lag-Unity-Zero Lead. For leading Power factor the value of KVAh should be equal to KWh, for the purpose of calculation of average power factor (on the basis of KWh / KVAh). i.e. The value of KVAh shall be based on lagging value of KVARh & KWh.

4.5 Power consumption - less than 1Watt and 4 VA /phase in voltage circuit and 2 VA/phase in current circuit.

5.0 CONSTRUCTION

5.1 The meter shall be projection type, dust and moisture proof. The cover shall be made of Polycarbonate material so as to give it tough and non-breakable qualities. The meter body shall be type tested for IP51 degree of protection.

5.2 Moulded standard single terminal block shall be provided for current and voltage connections to meet the requirement of terminal connection arrangement. The termination arrangement shall be provided with a transparent terminal cover, sealable independently, to prevent unauthorized tampering .

5.3 All insulating materials used in the construction of the meter shall be

substantially non-hygroscopic, non aging and of tested quality.

- 5.4 All parts that are likely to develop corrosion under normal working condition shall be effectively protected against corrosion by suitable method to achieve durable results.
- 5.5 Sealing provision shall be made against opening of the terminal cover and front cover. It is necessary to provide unidirectional screws with two holes for sealing purpose. The meter shall be pilfer-proof & tamper-proof.
- 5.6 The meter shall have Poly –carbonate opaque base and transparent cover of Poly-carbonate material, which shall be ultra-sonically (continuous welding) welded so that once the meter is manufactured and tested at factory, it should not be possible to open the cover at site except the terminal cover. The thickness of material for meter cover and base shall be 2 mm (minimum).
- 5.7 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 thermal overload of live parts in contact with them.
- 5.8 The real time quartz clock shall only be used in the meter for maintaining time (IST) and calendar. The time accuracy shall be as per provision of CBIP-88 Tech. report. Facility for adjustment of real time should be provided through CMRI with proper security.
- 5.9 The meter shall be completely factory sealed except the terminal block cover. The provision shall be made on the Meter for at least two seals to be put by utility user. The Terminal cover should be transparent with one side hinge with sealing arrangement.
- 5.10 The Push button shall be provided for high resolution reading of display, as brought out elsewhere in this specification.
- 5.11 The meter shall have a suitable test output device for testing meter. Preferably the blinking LED or other similar device like blinking LCD shall be provided. The test output device should have constant pulse rate i.e. Pulse/KWh and pulse/KVARh and its value (meter constant) should be indelibly printed on the name plate.
- 5.12 The meter accuracy shall not be affected by AC/DC magnetic field upto 0.2

Tesla on all the sides of meter i.e. front, sides, top and bottom of the meter as per CBIP-88 Technical Report with latest amendments. Moreover meter accuracy shall not be affected if permanent magnet of 0.5 Tesla is applied for 15 minutes . Under influence of any magnetic field (AC/DC/Permanent)above 0.2 Tesla, meter shall record energy considering I_{max} and reference voltage at unity power factor.

- 5.13 CTs are to be provided with magnetic shielding and they should be tested Separately prior to Assembly.
- 5.14 The meter shall also be capable to withstand and shall not get damaged if phase-to-phase voltage is applied between phases & neutral for five minutes.
- 5.16 In meter, power supply unit should be micro control type instead of providing transformer and then conversion to avoid magnetic influence.
- 5.17 Non specified display parameter in the meter should be blocked and it should not be accessible for reprogramming at site.
- 5.18 Complete metering system should not be affected by the external electromagnetic interference such as electrical discharge of cables and capacitors, harmonics, electrostatic discharges, external magnetic fields and DC current in AC supply etc. The Meter shall meet the requirement of CBIP Tech-report 88 (amended up to date).
- 5.19 The meter shall withstand any type of High Voltage and High Frequency surges which are similar to the surges produced by induction coil type instruments without affecting the accuracy of the meter .
- 5.20 The meter should have facility for data retrieval through optical port using CMRI or Laptop PC and Wired RS232 (RJ-11 type is also acceptable) communication port for remote meter reading facility. RS 232 port on terminal block is also acceptable. Sealing arrangement for both Optical & RS 232 port shall be provided.
- 5.21 Self Diagnostic Features.
 - 5.21.1 The meter shall keep log in its memory for unsatisfactory functioning or nonfunctioning of Real Time Clock battery, also it shall be recorded and indicated in reading file at base computer software.

4.21.2 All display segments: "LCD Test" display shall be provided for this purpose.

5.22 The meter shall have facility to read the default parameters during power supply failure. An internal maintenance free battery (Ni-mh or Li-ion or NI CD) of long life of 15 years shall be provided for the same. A suitable push button arrangement for activation of battery shall be provided. This battery may be of external type with inductive coupling arrangement. External battery is to be provided with inbuilt charger, in the ratio of one battery pack per 50 Nos meters.

5.23 Wire/Cable less design : The meter PCB should be wire less to avoid improper and loose connections/ contacts.

5.24 PCB used in meter shall be made by Surface Mounting Technology.

5.25 The RTC battery & the battery for display in case of power failure should be separate.

6.0 TOD TIMINGS

There shall be provision for at least 6 (Six) TOD time zones for energy and demand. The number and timings of these TOD time Zones shall be programmable.

At present the time zones shall be programmed as below:

TIME ZONE "A" 00.00 to 06.00 hrs and 22.00 to 24.00 hrs.

TIME ZONE "B" 06.00 to 09.00 hrs and 12.00 to 18.00 hrs.

TIME ZONE "C" 09.00 to 12.00 hrs.

TIME ZONE "D" 18.00 to 22.00 hrs.

7.0 ANTI TAMPER FEATURES

The meter shall detect and correctly register energy (Active + Reactive) only in forward direction under following tamper conditions:

7.1 The meter accuracy shall not be affected by change of phase sequence. It should maintain the desired accuracy in case of reversal of phase sequence.

7.2 The meter should continue to work even without neutral.

7.3 The meter should work in absence of any two phases i.e. it should work on any one phase wire and neutral, to record relevant energy.

- 7.4 If the magnetic field is more than 0.2 Tesla then the same should be recorded as magnetic tamper event with date & time stamping and the meter should record Energy considering the maximum value current (I_{max}) at ref. voltage and unity PF in all the three phases.

8.0 TAMPER EVENTS

The meter should have features to detect the occurrence and restoration of the following abnormal events.

- 8.1 Missing potential and potential imbalance.

The meter shall be capable of detecting and recording occurrence and restoration with date and time the cases of potential failure and low potential, which could happen due to disconnection of potential leads (one or two). Meter shall also detect and log cases of voltage unbalance (10% or more for 5 Minutes.) Higher of the 3 phase voltages shall be considered as reference for this purpose.

- 8.2 Current unbalance:

The meter shall be capable of detecting and recording occurrence and restoration with date and time of current unbalance (30% or more for 15 minutes) Higher of the 3 phase currents shall be considered as reference for this purpose.

- 8.3 Current Reversal:

The meter shall be capable of detecting and recording occurrence and restoration with date and time of reversal of current with phase identification for persistence time of 5 minutes. It should also possess a current reversal counter.

- 8.4 Power ON / OFF

The meter shall be capable to record power ON/OFF events in the meter memory. All potential failure should record as power off event.

The meter shall keep records for the minimum 280 events. (Occurrence + Restoration). For above abnormal conditions the recording of events shall be on FIFO basis. It shall be possible to retrieve the abnormal event data along with all related snap shots data through the meter optical port with the

help of CMRI & downloaded the same to the base computer. All the information shall be made available in simple & easy to understand format.

8.5 Current circuit short

The meter shall be capable of detecting and recording occurrences and restoration of shorting of any one or two phases of current.

9.0 DISPLAY OF MEASURED VALUES

9.1 Permanently backlit LCD panel shall show the relevant information about the parameters to be displayed. The corresponding non-volatile memory shall have a minimum retention time of 10 years. In the case of multiple values presented by a single display it shall be possible to display the content of all relevant memories. When displaying the memory, the identification of each parameter applied shall be possible. The principal unit for the measured values shall be the kilowatthour (kWh) for active energy, kVARh for reactive energy and kVAh for apparent energy.

9.2 The display shall be minimum full 6 digit type display. The size of digit should be minimum 8X5 mm. The decimal units shall not be displayed. The adequate back up arrangement for storing of energy registered at the time of power interruption shall be provided.

9.3 The meters shall be pre-programmed for following details. Display other than specified below shall be blocked.

- a) P.T.Ratio---- $11000/\sqrt{3}/110/\sqrt{3}$ V,
- b) C.T.Ratio----- 5/5 A.(1/1 A as the case may be).
- c) M.D. resetting should be manual
- d) MD Integration Period is 30 Minutes.
- e) Average power factor with 2 decimal digits shall be displayed.
- f) Billing parameters to be displayed presently shall be as shown below, but provision shall be as per specification.
- g) Load survey data for every 30 minutes and for previous 60 days for specified parameters. Load survey data shall be first in first out basis (FIFO)
- h) Tamper data will be stored in memory and retrieved by MRI or Laptop.

- i) The necessary software shall be provided.
- j) It should be possible to upload the MRI data to any PC having MRI software. A consumer based data uploading facility is required so that MRI will upload data only in that PC which has the concerned consumers` data . the consumer code+ meter No. Should be the key for creating consumers` files or overwriting consumers` files in PC. The software system files and data files should be stored in different directories.
- k) The “record number field should be 10 digits Alphanumeric.(2digit for Zones,2 for Circle & 6 for consumer No.) Before accepting the data for “Record Number” the system should wait for pressing of “Enter” key.
- l) Two separate fields should be provided for consumer name and address – one name field of one line , and other Address field for two lines

9.4 The meter shall be capable of recording and displaying automatically the following

9.4.1 **Normal mode** (with Scrolling time 9 sec)

- 1) LCD Test
- 2) Date and time
- 3) Cumulative kWh
- 4) Cumulative RkVAh lag
- 5) Cumulative kVAh
- 6) Present kVAMD
- 7)TOD kWh
- 8)TOD RkVAh lag
- 9)TOD kVAh
- 10)Average PF for the month, minimum 2 decimal digits
- 11) Number of MD reset.
- 12) Number of Tamper Count.

9.4.2 **Alternate Mode**

After using pushbutton the following parameters should be displayed..

- 1) TOD kWh
- 2) TOD RkVAh
- 3) TOD kVAH
- 4) Current kVAMD TOD

- 5) Cumulative kVAMD
- 6) Cumulative kWh
- 7) Cumulative RkVAh
- 8) Cumulative kVAh
- 9) Instantaneous Power Factor
- 10) Voltage R phase
- 11) Voltage Y phase
- 12) Voltage B phase
- 13) Current R phase
- 14) Current Y phase
- 15) Current B phase
- 16) kVAMD occurrence date & time TOD
- 17) MD reset count
- 18) High resolution kWh (for calibration)
- !9) High resolution RkVAh (for calibration)
- 20) Rising Demand with elapsed time
- 21) kVA value M1 TOD

Other kVAMD values shall be available in reset backup data for 6 months..

NOTE : The meter display should return to Default Display mode (mentioned above) if the ' Push button ' is not operated for more than 15 seconds..

9.5 The meter should measure & record total energy (Active + Reactive) consisting of energy due to harmonics.

9.6 Maximum Demand Integration Period :- Integration period for KVAMD should be of 30 minutes real time based. However it shall be programmable to 15 minutes if required.

9.7 MD RESET

The meter should have following MD resetting options.

- a) Automatic reset at the end of certain predefined period (say, end of the month) - This option shall be blocked by default and made programmable through hand held terminal /CMRI for the actual date required.
- b) Resetting through a hand held terminal (CMRI) capable of communicating with the meter.

c) Manual resetting arrangement with sealing facility.

10. **DEMONSTRATION**

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

11 **BILLING HISTORY & LOAD SURVEY**

The meter shall have sufficient non-volatile memory for recording history of billing parameters (Cumulative KWh at the time of reset and KVAMD) for last 6 months and load survey.

11.1 Load survey parameters :-

[i] KWh [ii] RKVAh [iii] KVAh [iv] KVAMD [v] Current per phase
[vi] Voltage per phase

The logging interval for load survey shall be 30 minutes. Load survey data shall be logged for last 60 days on non time based basis. i.e. if there is no power for more than 24 hours, the day should not be recorded Whenever meter is taken out and brought to laboratory the L/S data shall be retained for the period of actual use of meter. This load survey data can be retrieved as and when desired and load profiles shall be viewed graphically / analytically with the help of meter application software. The meter application software shall be capable of exporting / transmitting these data for analysis to other user software in spreadsheet format .

12.0 **COMPUTER SOFTWARE.**

12.1 The following Software shall be supplied by the Meter manufacturer without extra cost.

- 1] Resident Software (MS-DOS 5.0 or higher version) in the Meter Reading Instrument (CMRI) for data retrieval and programming the meter.
- 2] Base Computer Software for accepting data from CMRI and downloading instructions from base computer to CMRI.
- 3] Necessary software for loading application program via serial port.
- 4] Other special application software of the manufacturer for the Meter.

12.2 The Meter shall be capable to communicate directly with laptop computer.

Base Computer Software shall be suitable for all types of dot matrix & inkjet printers.

12.3 For efficient and speedy recovery of data downloaded through CMRI on base computer, licensed copies of base computer software shall have to be supplied. This software will be used at numbers of places up to Division level. As many copies of base computer software as required up to Division level shall be provided free of cost by Supplier.

12.4 The base computer software shall be Window based & user friendly. The data transfer shall be highly reliable and fraud proof (No editing shall be possible on base computer by any means. The software shall have capability to convert all the data into ASCII format.

12.5 ***The protocol used in the meter shall have to be provided at the time of supply for the purpose of Automatic Meter Reading System. Confirmation shall be given to that extent in GTP.***

The Suppliers shall also have to submit the protocol for meters supplied in the past and ensure that protocol corresponds to the type of meter supplied

The protocol shall be shared by MSEDCL.

13.0. **CONNECTION DIAGRAM AND TERMINAL MARKINGS.**

The connection diagram of the meter shall be clearly shown on inside portion of the terminal cover and shall be of permanent nature. Meter terminals shall also be marked and this marking should appear in the above diagram. The diagram and terminal marking on sticker will not be allowed.

14.0 **NAME PLATE AND MARKING**

Meter shall have a nameplate clearly visible, effectively secured against removal and indelibly and distinctly marked with all essential particulars as per relevant standards. Meter Serial Number shall be Bar Coded along with numeric number. The size of bar coded number should not be less than 35x5 mm. The manufacturer's meter constant shall be marked on the name plate. Meter serial number & bar code on sticker will not be allowed.

In addition to the requirement as per IS following shall be marked on the name plate.

- 1) Purchase order No.
- 2) Month and Year of manufacture

- 3) Name of purchaser i.e. MSEDCL
- 4) Guarantee of Five Years
- 5] ISI mark.

15.0 TESTS:-

15.1 Type Tests:-The Meter shall be fully type tested as per the relevant standards **within 5 years from the date of opening of Tender.** The type test reports of the offered meters shall be submitted along with the offer. All the Type Test shall be carried out from laboratories which are accredited by the National Testing and Calibration Laboratories (NABL) of Govt. of India such as CPRI Bangalore/ Bhopal, ERDA Baroda, to prove that the Meters meets the requirements of the specification. The Tenderers should also furnish certificate from laboratories where type tested that requisite test facility available in house for that particular test. Type Test Reports conducted in manufacturers own laboratory and certified by testing institute shall not be acceptable. The purchaser reserves the right to demand repetition of some or all the type tests in presence of purchaser's representative at purchaser's cost. For this purpose, the tenderer shall quote unit rates for carrying out each type test. However, such unit rates will not be considered for evaluation of the offer. **In case the meters is type tested earlier to 5 years from the date of opening of tender, the bidder have to carry our the fresh type tests at their cost before commencement of supply.**

15.2 Acceptance Tests:-ALL acceptance tests as per IS 14697/1999 shall be carried out on the meter.

15.3 Routine Test:- All routine tests as per IS:14697/1999 shall be carried out on all the meters.

15.4 Transportation Test:

At least 50% of the samples of the meters be tested for error at I_{max} , I_b and 5% I_b at unity power factor and 50% I_{max} and 10% I_b at 0.5 lagging Power Factor besides checking them for starting current. This test shall be conducted on ready to install meter i.e. meter cover ultrasonically welded & sealed. After recording these errors, the meters be put in their normal packing and transported for at least 50 km in any transport vehicle such as pick up van, Jeep, etc. on uneven rural roads and then re-tested at all these loads after the transportation. The variation in errors recorded before and after transportation should not exceed 1% at higher loads and 1.5% at loads below I_b .

15.5 Other Acceptance Tests :

- i. Meters shall be tested for tamper conditions as stated in this specification.

- ii. Glow wire testing for poly-carbonate body.
- iii. Power consumption tests shall be carried out.
- iv. The meter shall comply all the test for external AC/DC magnetic field as per CBIP Tech Report 88 with latest amendments. Moreover, the magnetic influence test for permanent magnet of 0.5 Tesla for minimum period of 15 minutes shall be carried out. After removal of magnet. meter shall be subjected to accuracy test as per IS 14697/1999 (amended up to date). No deviation in error is allowed in the accuracy as per specification.
- v. The meter shall withstand impulse voltage at 10 kV.

The test 15.5, (i) to (iii) shall be carried out at factory for each inspected lot at the time of pre dispatch inspection.

The tests 15.5 (iv) & (v) shall be carried out on one sample from first lot as per procedure laid down in IS14697/1999(amended up to date) and CBIP Tech-Report 88.(with latest amendments) in NABL LAB. The test report shall be got approved from CE(Dist.) before commencement of supply.

- 15.6 For influence quantities like voltage variation, frequency variation, voltage unbalance etc. the limits of variation in percentage error will be as per IS:14697/1999.(amended up to date)
- 15.7 **Guaranteed Technical Particulars:-** The tenderer should also furnish the particulars giving specific required details of Meters in schedule `A' attached. The offers without the details in Schedule `A' stand rejected.

16.0 **PRE-DESPATCH INSPECTION**

All Acceptance tests and inspection shall be carried out at the place of manufacturer unless otherwise specially agreed upon by the manufacturer and purchaser at the time of purchases. The manufacturer shall offer to the inspector representing the purchaser all the reasonable facilities, free of charge, for inspection and testing, to satisfy him that the material is being supplied in accordance with this specification. The Company's representative/Engineer attending the above testing will carry out testing as per IS:14697/1999 & this specification and issue test certificate approval to the manufacturer and give clearance for dispatch. The first lot of meter may be jointly inspected by the representative of the Chief Engineer (DISTRIBUTION) and the Executive Engineer (INSPECTION WING).

17.0 **JOINT INSPECTION AFTER RECEIPT AT STORES(Random Sample Testing)**

From each lot (lot means the total number of meters received in a Store out of inspected and approved lot by E.E.(IW) or purchaser's representative under one approval letter) of meters received at Stores, 5 sample meters shall be drawn and these meters will be tested by Our Testing Engineer in presence of

Supplier's representative jointly for (i) no load condition,(ii) limits of error test (iii) starting & (iv) repeatability of error test and (v) tamper conditions as per this specification. The 5 days advance intimation will be given to the supplier and if the suppliers fails to attend the joint inspection on the date informed ,the Testing will be carried out by our Testing Engineer in absence of suppliers representative .If the meters failed in above random sample testing, the lot will be rejected.

18.0 GUARANTEE

The Meter shall be guaranteed for the period of five years from the date of commissioning or five and half year from the date of despatch whichever is earlier. The meters found defective within the above guarantee period shall be replaced/repared by the supplier free of cost within one month of receipt of intimation. If the defective meters are not replaced/repared within the specified period above, the Company shall recover an equivalent amount plus 15 % supervision charges from any of the bills of the supplier.

19.0 PACKING

19.1 The meters shall be suitably packed in order to avoid damage or disturbance during transit or handling. Each meter may be suitably packed in the first instance to prevent ingress of moisture and dust and then placed in a cushioned carton of a suitable material to prevent damage due to shocks during transit. The lid of the carton may be suitably sealed. A suitable number of sealed cartons may be packed in a case of adequate strength with extra cushioning, if considered necessary. The cases may then be properly sealed against accidental opening in transit. The packing cases may be marked to indicate the fragile nature of the contents.

19.2 The following information shall be furnished with the consignment:

- Name of the consignee.
- Details of consignment
- Destination
- Total weight of consignment
- Sign showing upper/lower side of the crate
- Sign showing fragility of the material.

- Handling and unpacking instructions.
- Bill of Materials indicating contents of each package and spare materials.

20.0 TENDER SAMPLE

Tenderers are required to submit 07 nos. of meter samples of each offered type / item as per technical specification of tender document , from any one of the factories on or before the time and date stipulated for submission of offer , for evaluations. The samples shall be clearly marked with each type / item for which sample submitted and name of bidder. Out of these,Two samples should be without ultrasonic welding to confirm constructional features.

21.0 QUALITY CONTROL

The purchaser shall send a team of experienced engineers for assessing the capability of the firm for manufacturing of meters as per this specification. The team should be given all assistance and co-operation for inspection and testing at the bidder's works. The tenderer has to give all facilities for carrying out the testing of samples

22.0 MINIMUM TESTING FACILITIES

Manufacturer should possess fully **Automatic computerized Meter Test Bench System having inbuilt source and load adjustment** for carrying out routine and acceptance Tests as per IEC:687 or CBIP-88. In addition this facility should produce Test Reports for each and every Meter. The tenderer should have the necessary minimum testing facilities for carrying out the following tests.

- i) A.C. Voltage test
- ii) Insulation Resistance Test
- iii) Test on limits of errors
- iv) Test on meter constant
- v) Test of starting condition
- vi) Test of no-load condition
- vii) Repeatability of error test
- viii) Test of power Consumption
- ix) Vibration test
- x) Shock test

- xi) Tamper conditions - -as per MSEDCL, specification.
- xii) The manufacturer should have duly calibrated RSS meter of class 0.1 accuracy.

23.0 MANUFACTURING ACTIVITIES:-

- (i) Meter should be manufactured using SMT (Surface Mount Technology) components and by deploying automatic SMT pick and place machine and reflow solder process. Further, the Bidder should own or have assured access(through hire, lease or sub-contract) of above facilities.
- (ii) Quality should be ensured at the following stages:
 - (a) At PCB manufacturing stage each company shall be subjected to computerized bare company testing.
 - (b) At insertion stage all components should under go computerized testing for conforming to design parameters and orientation.
 - (c) Complete assembled and soldered PCB should under go functional testing using Automatic Test Equipments (ATEs)
 - (d) Prior to final testing and calibration, all meters shall be subjected to aging test (i.e. Meters will be kept in ovens for 72 hours at 55 °C temperature and atmospheric humidity under real life condition at it's full load current .After 72 hours meters should work satisfactory) to eliminate infant mortality.
 - (e) The calibration of meters shall be done in-house.
 - (f) The bidders should submit the list of all imported & indigenous components separately used in meter along with the offer.
 - (g) Bought out items:- A detailed list of bought out items which are used in the manufacture of the meter should be furnished indicating the name of firms from whom these items are procured. The bidder shall also give the details of quality assurance procedures followed by him in respect of the bought out items.

24.0 QUALITY ASSURANCE PLAN

24.1 The tenderer shall invariably furnish QAP as specified in **Annexure-I** along with his offer the QAP adopted by him in the process of manufacturing.

24.2 Precautions taken for ensuring usages of quality raw material and subcomponent shall be stated in QAP

25.0 The COMPONENT SPECIFICATION as per Annexure -III enclosed..

26.0 SCHEDULES:-

The tenderer shall fill in the following schedules which are part of tender specification and offer. If the schedules are not submitted duly filled in with the offer, the offer shall be liable for rejection.

Schedule `A' ... Guaranteed and technical particulars (As indicated in GTP parameters on E-Tendering)

Schedule `C' ... Tenderer's Experience

The discrepancies if any between the specification and the catalogs and/or literatures submitted as part of the offer by the bidders, the same shall not be considered and representations in this regard will not be entertained.

SCHEDULE - "C"

TENDERER'S EXPERIENCE

SR.NO	Order number	Number of Meters supplied-
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NAME OF FIRM _____

NAME & SIGNATURE OF TENDERER _____

DESIGNATION _____

DATE _____

ANNEXURE I

Quality Assurance Plan

A) The bidder shall invariably furnish the following information alongwith his bid, failing which his bid shall be liable for rejection. Information shall be separately given for individual type of material offered.

- i) Statement giving list of important raw materials, names of sub- suppliers for the raw materials, list of standards according to which the raw materials are tested. List of test normally carried out on raw materials in presence of Bidder's representative, copies of test certificates :
- ii) Information and copies of test certificates as in (i) above in respect of bought out accessories.
- iii) List of manufacturing facilities available.
- iv) Level of automation achieved and list of areas where manual processing exists.
- v) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.
- vi) List of testing equipment available with the bidder for final testing of equipment specified and test plan limitation. If any, vis-a-vis the type, special acceptance and routine tests specified in the relevant standards. These limitation shall be very clearly bought out in schedule of deviation from specified test requirements.

B) The successful bidder shall within 30 days of placement of order, submit following information to the purchaser.

- i) List of raw materials as well as bought out accessories and the names of sub-suppliers selected from those furnished alongwith offers.
- ii) Type test certificates of the raw materials and bought out accessories if required by the purchaser.
- iii) Quality assurance plan (QAP) with hold points for purchaser's inspection.

The quality assurance plant and purchasers hold points shall be discussed between the purchaser and bidder before the QAP is finalized.

C) The contractor shall operate systems which implement the following :

- i) Hold point : A stage in the material procurement or workmanship process beyond which work shall not proceed without the documental approval of designated individuals organizations. The purchaser's written approval is required to authorise work to progress beyond the hold points indicated in quality assurance plans.
- ii) Notification point : A stage in the material procurement or workmanship process for which advance notice of the activity is required to facilitate witness. If the purchaseer does not attend after receiving documented

notification in accordance with the agreed procedures and with the correct period of notice then work may proceed.

D) The successful bidder shall submit the routine test certificates of bought out accessories and central excise passes for raw material at the time of routine testing if required by the purchaser and ensure that Quality Assurance program of the contractor shall consist of the quality systems and quality plans with the following details.

i) The structure of the organization.

The duties and responsibilities assigned to staff ensuring quality of work.

The system for purchasing taking delivery and verification of material.

The system for ensuring quality workmanship.

The system for retention of records.

The arrangements for contractor's internal auditing.

A list of administration and work procedures required to achieve and verify contract's quality requirements these procedures shall be made readily available to the project manager for inspection on request.

ii) Quality Plans :

An outline of the proposed work and programme sequence. The structure of the contractor's organization for the contract.

The duties and responsibilities assigned to staff ensuring quality of work.

Hold and notification points.

Submission of engineering documents required by the specification.

The inspection of materials and components on receipt. Reference to the contractor's work procedures appropriate to each activity.

Inspection during fabrication/ construction.

Final inspection and test.

ANNEXURE II

DISPLAY SEQUENCE FOR THE PARAMETERS.

A) Default Display (With scrolling time 9 sec.)

- 1) LCD Test
- 2) Date and time
- 3) Cumulative kWh
- 4) Cumulative RkVAh lag
- 5) Cumulative kVAh
- 6) Present kVAMD
- 7) TOD kWh
- 8) TOD RkVAh lag
- 9) TOD kVAh
- 9) Average PF for the month, minimum 2 decimal digits
- 10) Number of MD reset.
- 11) Number of tamper counts.

B) On- demand Display :

After using pushbutton the following parameters should be displayed..

- 1.TOD kWh
- 2 TOD RkVAh
- 3 TOD kVAH
4. Current kVAMD TOD
- 5.Cumulative kVAMD
- 6.Cumulative kWh
- 7.Cumulative RkVAh
- 8.Cumulative kVAh
- 9.Instantaneous Power Factor
- 10.Voltage R phase
- 11.Voltage Y phase
- 12.Voltage B phase
- 13.Current R phase
- 14.Current Y phase

- 15.Current B phase
- 16.kVAMD occurrence date & time TOD
- 17.MD reset count
- 18.High resolution kWh (for calibration)
- 19.High resolution RkVAh (for calibration)
- 20.Rising Demand with elapsed time
- 21.kVA value M1 TOD
- 22.kVA value M2 TOD

NOTE :The meter display should return to Default Display mode (mentioned above) if the ' Push button ' is not operated for more than 15 seconds.

ANNEXURE III

Sr.No.	Component function	Requirement	Makes and Origin
1	Current Transformers	The Meters should be with the current transformers as measuring elements . The current transformer should withstand for the clauses under 5&9 of IS-14697/1999	The current transformer should withstand for the clauses under 5&9 of IS-14697/1999
2	Measurement or computing chips	The measurement or computing chips used in the Meter should be with the Surface mount type along with the ASICs.	USA: Anolog Devices, Cyrus Logic, Atmel, Philips South Africa :SAMES Japan : NEC
3	Memory chips	The memory chips should not be affected by external parameters like sparking, high voltage spikes or electrostatic discharges.	USA: Atmel, National Semiconductors, Texas Instruments, Philips, ST, Japan : Hitachi or
4	Display modules	a) The display modules should be well protected from the external Uv radiations. b) The display visibility should be sufficient to read the Meter mounted at height of 0.5 meter as well as at the height of 2 meters (refer 3.2 d for Viewing angle). c) The construction of the modules should be such that the displayed quantity should not disturbed with the life of display (PIN Type). d) It should be trans-reflective HtN or STN type	Hongkong : Genda Singapore: Bonafied Technologies. Korea: Advantek China : Success Japan : Hitachi, Sony.

		industrial grade with extended temperature range.	
5	Communication Modules	Communication modules should be compatible for the two ports (one optical port for communication with meter reading instruments & the other hardwired RS 232 port to communicate with various modems for AMR)	USA: National Semiconductors HP, Optonica Holland / Korea : Phillips Japan : Hitachi Taiwan: Ligitek
6	Optical port	Optical port should be used to transfer the meter data to meter reading instrument. The mechanical construction of the port should be such to facilitate the data transfer easily.	USA: National Semiconductors HP, Holland / Korea : Phillips Japan : Hitachi Taiwan: Ligitek
7	Power supply	The power supply should be with the Capabilities as per the relevant standards. The power supply unit of the meter should not be affected in case the maximum voltage of the system appears to the terminals due to faults or due to wrong connections	SMPS Type
8	Electronic components	The active & passive components should be of the surface mount type & are to be handled & soldered by the state of art assembly processes.	USA : National Semiconductors, Atmel,, Philips, Texas Instruments Japan : Hitachi, Oki, AVZ or Ricon Korea; Samsung
9	Mechanical parts	a)The internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc.	

		b) The other mechanical components should be protected from rust, corrosion etc. by suitable plating/painting methods.	
10	Battery	Chargeable maintenance free guaranteed life of 10 years.	Varta, Tedirun, Sanyo or National.
11	RTC & Micro controller.	The accuracy of RTC shall be as per relevant IEC / IS standards.	USA : Philips, Dallas Atmel, Motorola, Microchip Japan : NEC or Oki.
12	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm.	

ANNEXURE U-I
“INDEMNITY BOND”

UNDERTAKING TO BE SUBMITTED BY THE PARENT COMPANY SITUATED ABROAD IN CASE OF THE PARTICIPANT BIDDER WHO IS AN INDIAN BASED SUBSIDIARY ON GENERAL STAMP OF RUPEES 200/-

The Executive Director (Stores),
Maharashtra State Electricity Distribution Co. Ltd.,
Prakashgad, Bandra (E),
Mumbai – 400 056.

Dear Sir:

Sub:- Undertaking against Tender _____
for procurement of _____

We, M/s _____ having registered office at _____ are the Parent Company of M/s. _____ who have participated against your tender No. _____ for procurement of _____.

We have carefully read and have thoroughly understood and agree to the terms and conditions of the subject tender.

We hereby undertake that in case of placement of order against the subject tender on our subsidiary company, M/s. _____, in the event of we accept all the responsibilities and liabilities for supply of quality meters as per specification of the tender and execution of the contract. We further hereby undertake that we shall be responsible for any liability arising out of the contract placed on M/s. _____ and to pay MSEDCL on demand the sum of rupees as per agreement in the event of any breach of condition of the purchase order, loss and damage of the material till expiry of guarantee period as stipulated in the order.

Our liability here under shall not be impaired or discharged by extension of time or variation or alteration made with or without our knowledge or consent by or between the parties to the said contract. This undertaking shall be valid and binding on us upto and including the execution and guarantee period of the order and shall not be terminable by notice or change in the constitution of any of the companies. In case of any dispute arising out of or in connection with this tender or contract, if concluded, the same shall be subject to the exclusive jurisdiction of the **“Court in Mumbai (India).”**

Yours faithfully,
(Authorised Signatory)
FOR _____