

MAHARASHTRA STATE ELECTRICITY DISTRIBUTION CO. LTD.

TECHNICAL SPECIFICATION FOR 10-40 A LT THREE PHASE STATIC ENERGY METER (Agricultural Metering).

SPECIFICATION NO:- DIST(MM-IV/004) DT. 12.12.2006

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Maharashtra State Electricity Distribution Co.Ltd.

Technical Specification for 10-40 A LT Three Phase Static Energy Meters. (Agricultural Metering.) Specification No. DIST(MM-IV/004) DT. 12.12.2006

1.0 SCOPE:-

This specification covers the design, manufacture, testing and supply of ISI marked 10-40 A LT Three Phase Static Energy Meters suitable for measurement of Energy (kWh) and kVAMD in 3 phase, 4 wire balanced / unbalanced loads of LT Agricultural Consumers. The original manufacturer of LT AC Static Energy Meters shall quote against this tender. In case of foreign Manufacturer, the authorized agents/traders/distributors may also bid, provided they have all the testing facilities in India and Meters bear ISI mark.

2.0 QUALIFYING REQUIREMENTS :-

The bidder / manufacturer must have minimum three years experience to manufacture Three Phase Static Energy Meters and must have supplied minimum two Lakhs of Three Phase Static Energy Meters during this period. The bidder/manufacturer who offers these meters for the first time will be treated as New Supplier.

3.00 SERVICE CONDITIONS

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

3.01 Environmental Condition

Maximum ambient temperature (degree C)	55
Maximum ambient temperature in shade (degree C)	45
Maximum temperature of air in shade (degree C)	35
Maximum daily average temperature (degree C)	40
Maximum yearly weighted average temperature (degree C)	32
Relative Humidity (%)	10 to 95
Maximum Annual rainfall (mm)	1450
Maximum wind pressure (Kg/sqm)	150
Maximum altitude above mean sea level (meters)	1000
Isoceraunic level (days / year)	50
Seismic level (Horizontal acceleration)	0.3g
Climate:-	Moderately hot and humid tropical climate Conducive to rust and fungus growth

3.02 Current & Voltage Rating

- The current rating shall be 10-40A. Rated basic current (Ib) for L.T. Energy Meters shall be 10A per phase and the maximum continuous current (Imax) shall be 400% of rated basic current.
- The meters shall work accurately at 150% of Imax.

- The starting current for the meter should be 0.2% of I_b
- The rated voltage shall be 3x240 volts. The voltage range shall be (+) 20% to (–) 40% of rated voltage.

3.03 Temperature

The standard reference temperature for performance shall be 27 degree C. The mean temperature co-efficient should not exceed 0.07%.

3.04 Frequency

The rated frequency shall be 50 Hz with a tolerance of +/- 5%.

3.05 Power factor range Zero Lag – Unity – Zero lead.

- For leading Power factor the value of kVAh should 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 and kWh..

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

4.00 APPLICABLE STANDARD

The Meters shall conform to IS 13779/1999 (amended up to date) and other relevant IS specifications and CBIP Tech-report-88 amended up to date. The specification given in this document supersedes the relevant clauses of relevant standard specifications wherever applicable.

- The meter shall bear ISI mark.
- The class of accuracy of the Energy Meter shall be 1.0

5.00 CONSTRUCTION

5.01 The meter shall be projection type and should be dust and moisture proof. The cover shall be made out of such material so as to give it tough and non-breakable qualities and shall be secured to base by means of sealable captive screws. The meter body shall be type tested for IP51 degree of protection.

5.02 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.

5.03 All insulating materials used in the construction of the meter shall be substantially non-hygroscopic, non aging and of tested quality.

5.04 All parts that are likely to develop corrosion under normal working condition shall be effectively protected against corrosion.

5.05 The meter shall be pilfer-proof & tamper-proof. 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.
- 5.06 The meter shall have Poly-carbonate opaque base and transparent cover of Poly-carbonate- material, which shall be ultra-sonically 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).
 - 5.07 The real time quartz clock shall be used in the meter for maintaining time (IST) and calendar. Facility for adjustment of real time should be provided through CMRI with proper security.
 - 5.08 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.
 - 5.09 The push button shall be provided for high resolution reading of display as brought out elsewhere in this specification
 - 5.10 The blinking LED or other similar device like blinking LCD shall be provided to test the meter, the pulse rate of which either Pulse/kWH and Pulse/kVARH (meter constant) should be indelibly provided on the name plate.
 - 5.11 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. 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.
 - 5.12 Meter shall have CTS with magnetic shielding and same should be tested separately.
 - 5.13 The meter shall also be capable to withstand and shall not get damaged if phase to phase voltage is applied between phase to neutral.
 - 5.14 In meter, Power supply unit should be micro control type instead of providing transformer and then conversion to avoid magnetic influence.
 - 5.15 The RTC battery & the battery for display in case of power failure should be separate.
 - 5.16 Non specified display parameter in the meter should be blocked and same should not be accessible for reprogramming at site.
 - 5.17 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).
 - 5.18 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 meter.

5.19 Self Diagnostic Features:-.

"LED/LCD Test" display shall be provided for checking of all display segments.

5.20 The meter shall have facility to read the default display 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.

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

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

.6.00 ANTI TAMPER FEATURES

The meter shall detect and correctly register energy in forward direction under following tamper conditions:

6.01 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.

6.02 Reversal of line and load terminals. Even on interchanging the load and line wires, the meter should register correct energy passing through the meter.

6.03 Drawing of current through local Earth: The meter should register accurate energy even if load is drawn partially or fully through a local earth.

6.04 The three phase meter should continue to work even without neutral.

6.05 The three phase 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.

6.06 The meter should work without earth.

6.07 The potential link shall not be provided.

6.08 Visual indication shall be provided to safeguard against wrong connections to the meter terminals.

6.09 Meter should be immune to the (AC/DC) Permanent magnet of 0.2 Tesla as per CBIP-88 latest amendment. If the magnetic field (AC/DC/Permanent) is more than 0.2 Tesla then the meter should record Energy considering the maximum value current (I_{max}) at ref. voltage and unity PF in all the three phases.

7.00 TAMPER EVENTS

The meter should not get affected in case of following tamper events and record energy as per prevailing electrical conditions..

7.01 Missing potential and potential imbalance (10% or more for 5 Minutes).

7.02 Current unbalance (30% or more for 15 minutes).

7.03 Current Reversal

8.00 DISPLAY OF MEASURED VALUES

8.01 The display shall be permanently backlit LCD. The display shall be minimum full 5 digit type display. The size of digit should be minimum 10X5 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.

8.02 The display parameters will be preprogrammed at factory as per Annexure-II & the scroll period for auto scroll should be 9 sec.

The meter should Auto reset kWMD and kVAMD at 24.00 Hrs. of last day of every month and this value shall be stored in the memory along with the cumulative kWh reading. No reset push button shall be provided.

The display order shall be as per Annexure -II in addition to the above parameters.

8.03 Maximum Demand Integration Period :-Integration period for kWMD and kVAMD should be of 30 minutes real time based. However same shall be programmable to 15 minutes if required.

9.00 DEMONSTRATION

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

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10.00 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 & terminal marking on sticker will not be allowed.

11.00 NAME PLATE AND MARKING

Meter shall have a name plate 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 Five Years
- 5) ISI mark.

12.00 TESTS

12.01 Type Tests

Meter shall be fully type tested as per IS 13779/1999(amended up to date) and external AC/DC magnetic influence tests as per CBIP Tech-Report 88 with latest amendments. The Type Test Reports shall clearly indicate the constructional features of the type tested meters. Separate type Test Reports for each offered type of meters shall be submitted. All the Type Tests shall be carried out from Laboratories which are accredited by the National Board of Testing and Calibration Laboratories (NABL) of Govt. of India such as CPRI, Bangalore / Bhopal, ERDA Baroda, to prove that the meters meet the requirements of specification. Type Test Reports conducted in manufacturers own laboratory and certified by testing institute shall not be acceptable. 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.

Type test reports should be submitted along with offer. The type test report of meter having identical constructional and other features carried out during last three years will be valid. The type test report of 10-60A meters shall also be considered as the clause no. 3.02 states "Meter should work accurately at 150% of I_{max} ". As such the type test report of either 10-40 A or 10-60A will 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.

12.02 Meters shall pass all the acceptance and routine tests as laid down in IS: 13779/1999(amended up to date) and also additional acceptance tests as prescribed in this specification.

12.03 Additional Acceptance Tests:

The following additional tests shall be carried out in addition to the acceptance tests specified in IS 13779/1999 (amended up to date)

12.04.a) 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 .

12.04 b) Other Acceptance Test

- i) The meter shall withstand continuously for a period of at least 5 minutes at a voltage of 440 V between phase and neutral without damage/problems.
- ii) Meters shall be tested for tamper conditions as stated in this specification.
- iii) Glow wire testing for poly-carbonate body.
- iv) Power consumption tests shall be carried out.
- v) 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 13779/1999 (amended up to date). No deviation in error is allowed in the accuracy as per specification.
- vi) The meter shall withstand impulse voltage at 10 kV.

The test 14.3(b) (i) to (iv) shall be carried out at factory for each inspected lot at the time of pre dispatch inspection.

The tests 14.3 b) (v) & (vi) shall be carried out on one sample from first lot as per procedure laid down in IS13779/1999(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.

12.05 c) Limits of error

- i) Limits of variation in percentage error due to change in voltage shall not exceed the values given in the following table:

	Influence quantities	Value of current (Balanced unless: Otherwise stated	Power factor	Limits of variation in % error for class 0.5 meters
a)	Voltage variation between - 15% to +10%	I_b I_b	1 0.5 lag	0.7 1.0
b)	Voltage variation between - 40%,-15 %, +20 % and +10 % .	I_b I_b	1 0.5 lag	1.1 1.5

- ii) The meters shall be tested at (-) 15% and at (-) 40% of reference voltage as well as (+) 10% and (+) 20% of reference voltage and shall record energy within limits of variation indicated above.
- iii) For other influence quantities like frequency variation, voltage unbalance etc. the limits of variation in percentage error will be as per IS:13779/1999.(amended up to date)

12.06 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 purchase. 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 MSEDCL's representative / Engineer attending the above testing will carry out testing on suitable number of meters as per sampling procedure laid down in IS 13779/1999 (amended up to date) and additional acceptance test as per this specification and issue test certificate approval to the manufacturer and give clearance for dispatch. The meters shall be sealed after inspection at works.

The first lot of meter may be jointly inspected by the representative of the Chief Engineer (Distribution) and the Executive Engineer (INSPECTION WING).

12.07 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, sample meters shall be drawn as per Annexure 'E' of IS 13779/1999, amended up to date, tested by our Testing Engineer in presence of supplier's representative jointly for (i) starting current (ii) Limits of error, (iii) Repeatability of error as per IS 13779/1999 (amended up to date).

The 15 days advance intimation will be given to the supplier and if the supplier 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.

13.00 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 dispatch whichever is earlier. The meter found defective within above guarantee period shall be replaced / repaired by the supplier free of cost, within one month of receipt of intimation. If defective meters are not replaced / repaired within the specified period as above, the Board shall recover an equivalent amount plus 15% supervision charges from any of the bills of the supplier.

14.00 PACKING

14.01 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 crushing, if considered necessary. The cases may then be properly sealed against accidental opening in transit. 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.

14.02 The following information shall be furnished with the consignment:

- Name of the consignee
- Details of consignment
- Destination
- Total weight of the 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

15.00 TENDER SAMPLE

Tenderers are required to submit 10 nos. of meter samples of each offered type / item along with the 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.

16.00 QUALITY CONTROL

The purchaser has a right to send a team of experienced engineers for assessing the capability of the firm for manufacturing and testing of meters as per this specification. The item should be given all assistance and cooperation for inspection and testing at the bidder's work

17.00 MINIMUM TESTING FACILITIES

Manufacturer should possess fully computerized Meter Test Bench System for carrying out routine and acceptance Tests as per IS 13779/1999 (amended up to date). In addition this facility should produce Test Reports for each and every meter. The list of testing equipments shall be enclosed.

The manufacturer should have the necessary minimum testing facilities for carrying out the following tests:

- 1) Insulation resistance measurement
- 2) No load condition

- 3) Starting current test
- 4) Accuracy requirement
- 5) Power consumption in voltage circuit
- 6) Repeatability of error
- 7) Transportation test – as per clause no. 12.04(a) of MSEDCL specification
- 8) Tamper conditions - as per clause no. 7.00 of MSEDCL specification.
- 9) Shock and Vibration Test.
- 10) The manufacturer should have duly calibrated RSS meter of class 0.1 or better accuracy. The bidder should have fully automatic Test Bench having in-built constant voltage, current and frequency source with facility to select various loads automatically and print the errors directly.

18.00 MANUFACTURING ACTIVITIES

18.01 The manufacturer shall submit the list of plant and machinery along with the offer.

18.02 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, documentary proof shall be attached with the offer) of above facilities.

18.03 Quality should be ensured at the following stages.

18.03.01 At PCB manufacturing stage, each Board shall be subjected to computerized bare board testing.

18.03.02 At insertion stage, all components should under go computerized testing for conforming to design parameters and orientation

18.03.03 Complete assembled and soldered PCB should under go functional testing using Automatic Test Equipments (ATEs).

18.03.04 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 deg C temperature & at full load current. After 72 hours meters should work satisfactory) to eliminate infant mortality.

18.04 The calibration of meters shall be done in-house.

18.05 The bidders should submit the list of all imported and indigenous components separately used in meter along with the offer.

18.06 Bought out items

A detailed list of bought out items which are used in the manufacturing 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 following by him in respect of the bought out items.

19.00 QUALITY ASSURANCE PLAN

19.01 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.

19.02 Precautions taken for ensuring uses of quality raw material and sub-component shall be stated in QAP

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

21.00 SCHEDULES:-

The tenderer shall fill in the following schedules which are part and parcel of the 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.

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 - ' A'

**GUARANTEED TECHNICAL PARTICULARS FOR 10-40 A LT THREE PHASE
STATIC ENERGY METERS**

SR. NO.	PARAMETERS	FIELD
1	MAKE & TYPE	TEXT
2	APPLICABLE STANDARD IS 13779/1999 (AMENDED UP TO DATE) (YES/NO)	BOOLEAN
3	ACCURACY CLASS 1.0 (YES/NO)	BOOLEAN
4	RATED VOLTAGE 3X240 V(+20% TO -40%)(YES/NO)	BOOLEAN
5	BASIC CURRENT (Ib)10 AMP (YES/NO)	BOOLEAN
6	MAXIMUM CONTINUOUS CURRENT(I _{max}) 40 AMP (YES/NO)	BOOLEAN
7	STARTING CURRENT 0.2 % OF I _b (YES/NO)	BOOLEAN
8	SHORT TIME OVER CURRENT 150 % OF I _{max} (YES/NO)	BOOLEAN
9	DISPLAY PROVIDED BACKLIT LCD TYPE (YES/NO)	BOOLEAN
10	FIVE NUMBER OF DIGITS (YES/NO)	BOOLEAN
11	SIZE OF DIGITS 10X5 MM MINIMUM	TEXT
12	POWER CONSUMPTION OF VOLTAGE CIRCUIT 1W, 4VA (YES/NO)	BOOLEAN
13	POWER CONSUMPTION OF CURRENT CIRCUIT 2VA (YES/NO)	BOOLEAN
14	kWMD & kVAMD PROVIDED (YES/NO)	BOOLEAN
15	INTEGRATION PERIOD OF MD 30 MIN. (YES/NO)	BOOLEAN
16	MATERIAL OF BASE AND COVER POLYCARBONATE (YES/NO)	BOOLEAN
17	ALL ANTI-TAMPER FEATURES AS PER CLAUSE 6.00 ARE PROVIDED (YES/NO)	BOOLEAN
18	TYPE OF BATTERY PROVIDED INTERNAL/EXTERNAL	TEXT
19	FOR INTERNAL BATTERY ACTIVATION PUSH BUTTON IS PROVIDED. (YES/ NO)	BOOLEAN
20	FOR EXTERNAL BATTERY ONE BATTERY SET IS PROVIDED PER 50 NOS. OF METERS (YES /NO)	BOOLEAN
21	TERMINAL BLOCK COVER IS PROVIDED WITH SEALING ARRANGEMENT (YES/NO)	BOOLEAN
22	FIVE YEARS GUARANTEE IS GIVEN (YES/NO)	BOOLEAN
23	IN-HOUSE TESTING FACILITIES FOR FOLLOWING TEST ARE AVAILABLE	
23.1	INSULATION RESISTANCE MEASUREMENT (YES/NO)	BOOLEAN
23.2	NO LOAD CONDITION (YES/NO)	BOOLEAN
23.3	STARTING CURRENT TEST (YES/NO)	BOOLEAN
23.4	ACCURACY REQUIREMENT (YES/NO)	BOOLEAN
23.5	POWER CONSUMPTION (YES/NO)	BOOLEAN
23.6	REPEATABILITY OF ERROR (YES/NO)	BOOLEAN
23.7	TRANSPORTATION TEST AS PER CLAUSE NO. 14.04(A) OF SPECIFICATION (YES/NO)	BOOLEAN
23.8	TAMPER CONDITIONS -AS PER CLAUSE NO. 7.00 OF SPECIFICATION (YES/NO)	BOOLEAN

23.9	THE VIBRATION AND SHOCK TEST (YES/NO)	BOOLEAN
23.10	THE MANUFACTURER SHOULD HAVE DULY CALIBRATED RSS METER OF CLASS 0.1 ACCURACY (YES/NO)	BOOLEAN
23.11	LONG DURATION TEST (YES/NO)	BOOLEAN
24	FURNISH PRINCIPLE OF OPERATION OF METER OUTLINING THE METHODS AND STAGES OF COMPUTATIONS OF VARIOUS PARAMETERS STARTING FROM INPUT VOLTAGE AND CURRENT SIGNALS INCLUDING SAMPLING RATE IF APPLICABLE	FILE
25	MANUFACTURING ACTIVITIES AS PER CLAUSE 20.00 SUBMITTED-YES/NO (DETAILS SHALL BE SUBMITTED SEPARATELY IN A SEALED COVER ALONG WITH OFFER.)	FILE
26	WHETHER TYPE TESTED (YES/NO)	BOOLEAN
27	TYPE TEST REPORT NO.	TEXT
28	WHETHER QAP SUBMITTED AS PER ANNEXURE-I (YES/NO)	BOOLEAN
29	BATTERY BACK UP IS PROVIDED (YES/NO)	BOOLEAN
30	QUALIFING REQUIREMENT OF MINIMUM THREE YEARS OF MANUFACTURING THREE PHASE STATIC ENERGY METERS (YES/NO)	BOOLEAN
31	QUALIFING REQUIREMENT OF SUPPLY OF MINIMUM TWO LAKHS THREE PHASE STATIC ENERGY METERS DURING ABOVE PERIOD (YES/NO)	BOOLEAN
32	PCB IS MANUFACTURED BY SMT AND WITHOUT ANY WIRE LOOPS AND JOINTS (YES/NO)	BOOLEAN

SCHEDULE - "C"

TENDERER'S EXPERIENCE

The Tenderer shall furnish list of similar order executed or under execution of supplying three phase static energy meters by him to whom a reference may be made by purchaser in case he consider such a reference necessary.

SR. NO.	NAME OF CLIENT	ORDER NO. & DATE	QTY. ORDERED	QTY. 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 purchaser 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 of 10-40 Amp. L.T. 3-Ph. Static Energy Meters

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

1. LCD Test
2. Date – Day/Month/Year
3. Time – Hrs:Min:Sec.
4. Cumulative kWh
5. Cumulative kVAh
6. Cumulative RkVAh (lag)
7. Current Month kWMD
8. Current Month kVAMD
9. Previous month kVAMD 1
10. Last month kVAMD 2
11. Total number of resets
12. Power Factor (Average P.F. based on kVAh)
13. Total number of Tamper Counts
14. Phase to neutral Voltage R phase.
15. Phase to neutral Voltage Y phase
16. Phase to neutral Voltage B phase.
17. Line current R phase
18. Line current Y phase
19. Line current B phase
20. High resolution kWh (For calibration)
21. Rising MD with remaining time up to EOI (For calibration)

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-13779 /1999	The current transformer should withstand for the clauses under 5&9 of IS-13779 /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
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 industrial grade with extended temperature	Hongkong : Genda Singapore: Bonafied Technologies. Korea: Advantek China : Success Japan : Hitachi, Sony.

		range.	
5	Communication Modules	Communication modules should be compatible for the two ports (one for optical port for communication with meter reading instruments & the other for the 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 / Koread : 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. It should not also be affected by magnet	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 intenal electrical components should be of	

		<p>electrolytic copper & should be protected from corrosion, rust etc.</p> <p>b) The other mechanical components should be protected from rust, corrosion etc. by suitable plating/painting methods.</p>	
10	Battery	<p>Maintenance free battery (Ni-mh or Li-ion) of long life of 15 years.</p> <p>Makes & origin : Varta, Tedirun, Sanyo or National</p>	<p>Makes : Varta, Tedirun, Sanyo or National</p>
11	RTC & Micro controller.	<p>The accuracy of RTC shall be as per relevant IEC / IS standards.</p>	<p>USA : Philips, Dallas Atmel, Motorola, Microchip</p> <p>Japan : NEC or Oki.</p>
12	P.C.B.	<p>Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm.</p>	