
	The K- Electric Limited			
	TPRE (Planning & Engineering – Distribution)			
	SAP Document Code:	10000000166	Specs. #.	K/R&D/SSP/22 (Rev-02)
	Specification	Static Single Phase Two Wire Energy Meters (Accuracy Class-I)		

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1. Specification No. K/R&D/SSP/22 Rev (02). dated 19th Mar, 2012
2. Amendment No.1 dated 30th Jan , 2015
3. Amendment No.2 dated 1st July, 2016
4. Amendment No.3 dated 31st July, 2017


Note: Amendment – 03 will be applicable with effect from April, 2018.

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Specification for Static Single Phase Two Wire Energy Meters (Accuracy Class-1)

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0.0 Foreword

0.1 This Specification has been prepared by Technical Process Re-Engineering (TPRE) Department.

0.2 This Specification is intended for the purpose of technical specification only for the procurement of material and does not include provisions of contract, unless otherwise provided in the contract.

0.3 This Specification is subject to revision as and when required.

1.0 Scope

1.1 The Specification covers total static single phase 2 wire energy meters accuracy class 1.0 and capable of measuring kW & kWh.

2.0 Reference Standards

2.1 The Reference Standards are listed and provided in Annex – I.

3.0 Definitions

3.1 Static Watt-Hour Meter

Meter in which current and voltage act on solid state (electronic) elements to produce an output proportional to watt-hour.

3.2 Measuring Element

Part of the meter which produces an output proportional to the energy.

3.3 Test Output

Device which can be used for testing the meter.

3.4 Operation Indicator

Device which gives a visible signal of the operation of the meter.


3.5 Memory

Element which stores digital information.

3.6 Non-Volatile Memory

Memory which can retain information in the absence of power.

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3.7 Display

Device which displays the content(s) of (a) memory(ies).

3.8 Register

Electronic device operating both memory and display which stores and displays information.

3.9 Current Circuit

Internal connections of the meter and part of the measuring element through which flows the current of the circuit to which the meter is connected.

3.10 Voltage Circuit

Internal connection of the meter part of the measuring element and power supply for the meter supplied with the voltage of the circuit to which the meter is connected.

3.11 Auxiliary Circuit

Elements (lamps, contacts, etc) and connections of an auxiliary device within the meter are intended to be connected to an external device, for example clock, relay, impulse counter.

3.12 Constant

Value expressing the relation between the energy registered by the meter and the corresponding value of the test output. If this value is a number of pulses, the constant should be either pulses per kilowatt-hour (imp.kWh) or watt hours per pulse (Wh/imp).

3.13 Indoor Meter

Meter which can only be used with additional protection against environmental influences (mounted in a house, in a cabinet) .

3.14 Outdoor Meter


Meter which can be used without additional protection in an exposed environment.

3.15 Base

Back of the meter by which it is generally fixed and to which are attached the measuring element, the terminals or the terminal block, and the cover.

3.16 Cover

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Enclosure on the front of the meter, made either wholly of transparent material or opaque material provided with window(s) through which the operation indicator (if fitted) and the display can be read.

3.17 Case

Comprises the base and the cover.

3.18 Protective Earth Terminals

Terminal connected to accessible conductive parts of the meter for safety purposes.

3.19 Terminal Block

Support made of insulating material on which all or some of the terminals of the meter are grouped together.

3.20 Clearance

Shortest distance measured in air between two conductive parts.

3.21 Creep Distance

Shortest distance measured over the surface of insulation between two conductive parts.

3.22 Basic Insulation

Insulation applied to live parts to provide basic protection against electric shock.

3.23 Basic Current (I_b)

Value of current in accordance with which the relevant performance of the meter is fixed.

3.24 Maximum Current (I_{max})

Highest value of current at which the meter purports to meet the accuracy requirements of this standard.

3.25 Reference Voltage (U_n)

Value of the voltage in accordance with which the relevant performance of the meter is fixed.


3.26 Reference Frequency

Value of the frequency in accordance with the relevant performance of the meter is fixed.

3.27 Percentage Error

Percentage error is given by the following formula:

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$$\text{Percentage error} = \frac{\text{Energy registered by the meter} - \text{True Energy}}{\text{True Energy}} \times 100$$

Since the true value cannot be determined, it is approximated by a value with a stated uncertainty that can be traced to standards agreed upon between manufacturer and user or to national standards.

3.28 Reference Conditions

Appropriate set of influence quantities and performance characteristics, with reference values, their tolerances and reference ranges, with respect to which the intrinsic error is specified.

3.29 Electromagnetic Disturbance

Conducted or radiated electromagnetic interference which may effect functionally or meteorologically the operation of the meter.

3.30 Rated Operating Conditions

Set of specified measuring ranges for performance characteristics and specified operating ranges for influence quantities, within which the variations of operating errors of a meter are specified and determined.

3.31 Specified Operating Range

Range of values of a single influence quantity which forms a part of the rated operating conditions.

3.32 Limit Range of Operation

Extreme conditions which an operating meter can withstand without damage and without degradation of its metrological characteristics when it is subsequently operated under its rated operating conditions.

3.33 Storage & Transport Conditions

Extreme conditions which a non-operating meter can withstand without damage and without degradation of its meteoric.


3.34 Normal Working Position

Position of the meter defined by the manufacturer for normal service.

3.35 Thermal Stability

Thermal stability is considered to be reached when the change in error as a consequence of thermal effects during 20 min. is less than 0.1 times the maximum permissible error for the measurement under consideration.

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4.0 Performance Standards

- | | | | |
|-----|------|-----------------------|-------|
| 4.1 | i) | Reference Temperature | 23°C |
| | ii) | Reference Frequency | 50 Hz |
| | iii) | Reference voltages | 230 V |

4.2 Climatic Condition

- | | | |
|------|-----------------------------------|---|
| i) | Maximum ambient air temperature | 50°C |
| ii) | Maximum daily average temperature | 45°C |
| iii) | Minimum ambient air temperature | 0 C |
| iv) | Maximum relative humidity | 95% |
| v) | Altitude | Sea Level |
| vi) | Location | Sea coast (interior is semi-desert) |
| vii) | Pollution | Severe marine pollution on account of windblown, sand and dust with salt content and salt laden spray and mist. |

5.0 Mechanical Requirements

5.1 General Mechanical Requirements

Meters shall be designed and constructed for Outdoor use in such a way as to avoid introducing any danger in normal use and under normal conditions, so as to ensure especially:-

- Personal safety against electric shock.
- Personal safety against effects of excessive temperature.
- Protection against spread of fire.
- Protection against penetration of solid objects.
- Protection against Dust and Water.


All parts which are subject to corrosion under normal working conditions shall be protected effectively. Any protective coating shall not be liable to damage by ordinary handling nor damage due to exposure to air, under normal working conditions. Meters shall withstand solar radiation test.

- 5.2 The electrical connections in the meter shall be resistant to tampering. These shall be made so as to prevent their opening from outside the meter base/cover accidentally or deliberately without breaking the seals.

5.3 Case

- 5.3.1 The meter shall have a dust proof and moisture proof case which can be sealed in such a way that the internal parts of the meter are accessible only after breaking the seals. The meter shall comply with the dust proof and water proof IP-54 requirements of IEC-60529 (latest edition).

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5.3.2 Meter Cover

The cover of meter shall either be made of clear or opaque shatter proof ultra violet stabilized polycarbonate material. In case of Clear polycarbonate material the electronics of the meter shall be protected with a shield inside the Meter Cover made of a suitable opaque material to protect the electronics from extreme environmental / especially solar radiation conditions.

5.3.3 Meter Base

The base of the meter shall be made of strong insulating material.

5.3.4 Meter Security Box

The meter is to be supplied in a transparent Polycarbonate Meter Security Box. Meter Security Box shall be designed incorporating the following requirements.

- i) Thickness of Polycarbonate shall be 2 mm minimum.
- ii) Continuous Ultrasonic welding shall be provided at the points of contact between Upper and Lower parts and the Meter Cover. The Meter Cover maybe integrated with the Upper part of the Meter Security Box.
- iii) The Terminal Strip once inserted cannot be pulled back.
- iv) The Terminal Strip once fully inserted should be flush with side wall.
- v) Terminal Strip in fully inserted position should cover the Terminal hole opening completely and it shall not be possible to pull it back for all practical purposes.
- vi) Provision should be made to avoid accidental insertion of Terminal Strip before installation.
- vii) The Meter Box shall be supplied with Rag Bolts alongwith nut and washer.
- viii) Printing of KE meter number at the following three locations:
 - a. At inside of front of Polycarbonate Security Box.
 - b. On the sliding strip.
 - c. At inside of the back of Polycarbonate Security Box.


5.4 Terminals – Terminal Block

5.4.1 The terminals shall be grouped in a terminal block having adequate insulating properties and mechanical strength. The material (Bakelite or similar material) of which the terminal block is made shall be capable of passing the glow wire test of 960 °C while terminal cover and meter case shall be capable of passing of 650 °C temperature test given in IEC-62052-11 (latest edition).

5.4.2 Arrangements may be provided to prevent the exit of terminal block by force from outside without opening the meter cover.

5.4.3 The terminal shall be pressure plate type to permit the connection of both solid and stranded aluminum / copper conductor of cross sectional area 16 mm² to a depth of at least 20mm without being directly bitten by the screws used for fixing the conductors. The terminals in which screws bite directly into the conductor shall not be acceptable.

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5.4.4 The moving parts of the terminals including screws shall be made of brass having minimum electrical conductivity of 65% of copper. The fixed part of terminal i.e. pressure plate shall be made of copper having a thickness of 2.4 mm and minimum electrical conductivity of 99.99% of stranded copper.

5.4.5 The terminals shall be Tin or Nickel plated. In case of Tin plating the thickness shall be 20 microns on all parts except threaded portions on which it shall be min 10 microns. In case of Nickel plating the coating thickness shall be 10 microns on all parts except the threaded portion on which it shall be min 7 microns.

5.5 Earthing Connection Arrangement

As the base is of insulating material, the common ground of the main PCB shall be internally connected to the neutral point of the terminal block.

5.6 Protection Against Heat, Fire, Penetration of Dust & Water, Solar Radiation.

The complete meter shall meet the requirements of IEC 62052-11 (latest edition). For protection against penetration of dust & water the meter shall be IP 54 compliant.

6.0 Electrical Requirements


6.1 Standard Ratings

Basic /max. Current	10/40 Amp
Reference Voltage	230 V
Reference Frequency	50 Hz
Accuracy Class	1.0
Meter Type	Static Single Phase 2 Wire, 230 V, 10(40) Amp 50 Hz, Accuracy Class 1.0 – Energy Meters.

6.2 Other Electrical Requirements

Power Losses of voltage circuit at reference voltage	2.0 W & 10 VA
Power Losses of Current circuit at basic current	4 VA
Starting current	0.4% of Ib at unity power factor
Running with no load	From 0.8 to 1.15 of reference voltage but with no current. Meter shall not produce more than one pulse.
Temperature rise of external surface	25 Degree C with ambient temp. of 45°C.
Temperature rise of terminal	30 Degree C with ambient temp. of 45°C.

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6.3 Dielectric strength

Power frequency Withstand	4 KV for one minute
Impulse voltage Withstand	8 KV : 1.2/50 micro sec & minimum 9 joules
Short time Over current	30 times I _{max} with a relative tolerance of 0% to -10% for ½ cycle at rated frequency
Insulation resistance	More than 5 Mega Ohms
Creepage	20 mm min
Clearance	8 mm min

6.4 Voltage Range

Specified operating Range	From 0.9 to 1.1 of reference voltage
Extended operating range	From 0.60 to 1.15
Limit range of operation	From 0.35 to 1.9 of ref. voltage

6.5 Accuracy Requirement


6.5.1 Limits of error due to variation of the current

When the meter is under reference conditions given in IEC 62053-21 (latest edition), the percentage errors shall not exceed the limits given in Table-I.

Table - I
Percentage Error Limits

Value of Current	Power Factor	Percentage error Limits for meters
$0.05 I_b \leq I < 0.1 I_b$	1	± 1.5
$0.1 I_b \leq I \leq I_{max}$	1	± 1.0
$0.1 I_b \leq I < 0.2 I_b$	0.5 lagging	±1.5
	0.8 leading	± 1.5
$0.2 I_b \leq I \leq I_{max}$	0.5 lagging	± 1.0
	0.8 leading	± 1.0
$0.2 I_b \leq I \leq I_b$	0.25 lagging	± 3.5
	0.5 leading	± 2.5

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6.6 Influence of Other Quantities

6.6.1 Limits of Error Due to Influence Quantities:

The additional percentage error due to the change of influence quantities with respect to reference conditions, as given in IEC 62053-21 (latest edition) shall not exceed the limits given in Table-II.


Table – II
Influence Quantities

Influence quantity		Value of current (balanced unless) otherwise	Power Factor	Limits of Variation in % age error for meters
Ambient temperature variation		0.1 $I_b \leq I \leq I_{max}$ 0.2 $I_b \leq I \leq I_{max}$	1 0.5 lagging	0.05 %/K 0.07 %/K
Voltage variation $\pm 10\%$		0.05 $I_b \leq I \leq I_{max}$ 0.1 $I_b \leq I \leq I_{max}$	1 0.5 lagging	0.7 1.0
Frequency variation $\pm 2\%$		0.05 $I_b \leq I \leq I_{max}$ 0.1 $I_b \leq I \leq I_{max}$	1 0.5 lagging	0.5 0.7
Harmonic components in the current and voltage circuits		0.5 I_{max}	1	0.8
DC and even harmonics in the AC current circuit		0.5 I_{max}	1	3.0
Odd harmonics in the AC current circuit		0.5 I_b 2)	1	3.0
Sub-harmonics in the AC current circuit		0.5 I_b 2)	1	3.0
Continuous magnetic induction of external origin		I_b	1	2.0
Magnetic induction of external origin 0.5 mT		I_b	1	2.0
Electromagnetic RF fields		I_b	1	2.0
Operation of accessories		0.05 I_b	1	0.5
Conducted disturbances, induced by radio- frequency fields		I_b	1	2.0
Fast transient burst		I_b	1	4.0

- i) For the voltage ranges from -20% to -10% and + 10 % to + 15% the limits of variation in percentage errors are three times the values given in this table.

Below 0.8 U_n the error of the meter may vary between + 10% and -100%.

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- ii) The distortion factor of the voltage shall be less than 1%.
- iii) This test does not apply to transformer-operated meters. The test conditions are specified in Clause A.1.
- iv) The test conditions are specified in IEC-62053-21(Latest addition)
- v) A magnetic induction of external origin of 0.5 mT produced by a current of the same frequency as that of the voltage applied to the meter and under the most unfavorable conditions or phase and direction shall not cause a variation in the percentage error of the meter exceeding the values shown in this table.

400 The magnetic induction shall be obtained by placing the meter in the centre of a circular coil, 1 m in mean diameter of square section and of small radial thickness relative to the diameter and having At.

- vi) The recommended test point for voltage variation and frequency variation is Ib for direct connected meters.
- vii) The mean temperature coefficient shall be determined for the whole operating range. The operating temperature range shall be divided into 20 K wide ranges. The mean temperature coefficient shall then be determined for these ranges by taking measurements 10 K above and 10 K below the middle of the range. During the test, the temperature shall be in no case outside the specified operating temperature range.

6.7 Meter Constant

The relation between the test output and the indication in the display shall comply with the marking on the name plate.

Output devices generally do not produce homogeneous pulse sequences. Therefore, the manufacturer shall state the necessary number of pulses to ensure a measuring accuracy of at least 1/10 of the class of the meter at the different test points.

7.0 Basic Data Recording


7.1 Static Watt Hour Meter

- Energy (Kwh).
- MDI Reading.

7.2 Security Features

- Every meter shall have a unique Sr. No. in its memory which can be displayed.
- Meter shall be capable of recording energy accurately in the case of change of phase with the neutral wire.

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- LED indications shall be provided for the following:
 - Earth.
 - Power.
 - Neutral.
 - Reverse Energy Flow.
 - Impulse/KWH.
- Energy recording and accuracy of meter at 0.1 lb at ref. condition shall remain within $\pm 2\%$ even if phase from mains connected to any terminal of meter and earthing used as a neutral.
- Meter shall be protected against external interference such as influence of strong electro magnet, CD drive, mobile phones and shall comply with all relevant IEC/ANSI standards for functional performance and loss of data.
- The meter shall be properly shielded against the affects of strong magnetic field on 0.7 tesla.

7.2.1 The accuracy test of single phase static meters for conformation of security features as per clause 7.2. The Seven (07) tests details are mentioned in Annexure-A (Anti Theft Tests).

7.3 Back-up Battery

- The Back-up Battery shall be of Lithium-Ion type.
- Low Battery indication shall be displayed when min. 25% battery life is left.
- Storage life of Battery shall be more than 15 years.
- Without any Power the Back-Up battery shall maintain the time, calendar, Multi-Rate program & function of LCD display during power outage for a continuous period of at-least 24 months.
- The battery shall be connected using standard connectors, it shall not be welded, brazed or soldered.

7.4 Display


Maximum demand should reset automatically on 1st of each month at 00.00 hrs. The meter shall display last month maximum demand and current month maximum demand respectively.

- Display shall be active in case of no power.
- The display shall be LCD type with at least 6 whole digits without decimal for energy consumption.
- Maximum demand shall have two whole digits and two decimal digits.
- Display mod indicator.
- Display quantity labels.
- Pulse output for field testing of meter.

7.4.1 Display sequence shall be as under: -

- KE Number.
- KWH Reading.
- Previous month MDI.
- Current month MDI.

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- Instantaneous Power KW.

8.0 Type Test

8.1 The type tests are intended to verify compliance of the characteristics of the meter with the relevant requirements of this specification. In case of any change of internal component in the currency of contract the type test shall be carried out a fresh. The tests shall be carried out at an independent Laboratory in the presence of KE engineers from TPRE & Meter Department. All expenditure regarding air ticket, boarding, lodging etc. shall be borne by the bidder. Criteria of selection of samples and acceptance / rejection shall be as per relevant IEC.

Following type tests shall be carried out on KWH & KW meters as per IEC 62052-11 and other relevant IECs (latest editions).

8.1.1 Tests of mechanical requirements

- Spring hammer test.
- Shock test.
- Vibration test.
- Test of resistance to heat and fire.
- Test of protection against penetration of dust and water.

8.1.2 Test of climate influence

- Dry heat test.
- Cold test.
- Damp heat cycle test.
- Solar Radiation test.


8.1.3 Tests of electrical requirements

- Test of power consumption of voltage circuit.
- Test of power consumption of current circuit.
- Test of effect of voltage dips and short interruptions.
- Test of influence of short time over current.
- Test of influence of self heating.
- Test of influence of heating.
- Impulse voltage test.
- A.C. voltage test.

8.1.4 Tests for electromagnetic compatibility (EMC)

- Test of immunity to electrostatic discharges.
- Test of immunity to electromagnetic HF fields.
- Fast transient burst test.
- Radio interference measurement.

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8.1.5 Tests of Accuracy requirements (for KWH meter parts as per IEC 62053-21 (latest edition) where applicable

- Test of Accuracy.
- Test of influence quantities.
- Test of no load condition.
- Test of starting condition.

9.0 Name & Rating Plate

9.1 A suitable name/rating plate shall be provided inside at the front of the meter, indicating the following information:

- Name of the manufacturer and country of origin.
- Type of meter.
- Number of phases and number of wires.
- Nominal and maximum current, nominal voltage and frequency.
- Accuracy class.
- Meter constant.
- KE P.O. No.
- KE Meter No. and year of manufacturer.
- KE property, not for sale.
- Display sequence should be printed on nameplate.
- SAP Item Code NO.

10.0 Packing

Each meter shall be individually packed in thermo pore packing or thermo pore lined packing, covered with adhesive tape at joints or plastic strips etc.

The packing shall be strong enough to withstand rigors of ocean, rail, road etc.

11.0 Sample

At least three number samples of meter shall be submitted with the bid.

12.0 Pre-Shipment Inspection


The successful bidder shall offer the meters for testing/inspection, Procedure for pre-shipment inspection is given below:

12.1 Routine Tests

Following routine tests shall be carried out on KWH, KW meters as per respective IECs by the manufacturer:

- Accuracy Test.
- Running with no load test.
- Starting current test.

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- Insulation resistance test.

12.2 Sample Tests (Electrical)

- 12.2.1 The meters offered for acceptance shall be grouped into lots containing upto 1000 meters. A sample comprising of five (05) meters shall be selected at random from each lot and subjected to tests as below:

Starting Current Test.

Creep Test.

Accuracy Test.

A.C. Voltage Test

- 12.2.2 The meters offered for acceptance shall be grouped into lots containing upto 1000 meters. A sample comprising of two (02) meters shall be selected at random from each lot and subjected to following tests:

Impulse test.

Power loss test.

Fast transient burst test.

Influence of harmonics test.

DC and even harmonics test.

Dry Heat Test at 80°C.

- 12.2.3 The lot shall be accepted if all the meters qualify in the tests described in clause 12.2.1 & 12.2.2 above. The lot shall be rejected if two or more meters fail in any of the tests. If any one meter fails in any of the above tests re-sampling shall be carried out after collecting same No. of meters and subjected to the tests described in clause 12.2.1 & 12.2.2 above. If any one meter fails in any of the above tests the whole lot shall be rejected.

12.3 Sample Tests (Mechanical)

- 12.3.1 The meter offered for acceptance shall be grouped into lots containing upto 1000 meters. Sample comprising of three (03) meters shall be selected at random from each lot and subjected to tests as below:


Sr. No.	Description	Nos. of Meters
1.	Test of protection against penetration of Dust and water.	Two meter.
2.	Dimensional Check.	One meter.

The lot shall be accepted if meters qualify the above tests in clause 12.3.1. In case any meter fails in the relevant test, another sample of double the size shall be selected and test/tests repeated. If any meter fails in the relevant in the second group, the entire lot shall be rejected.

12.4 Verification Test of Functionality of Software

- 12.4.1 Verification test of the functionality of software and display features on offered meters shall be promoted by loading/unloading of programme and auditing the diagnostic reports. The number of

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meters shall be three if any meter fails to comply with the functionality requirements the entire offered lot shall be rejected.

- 12.5 The remaining type tests not performed on the above samples shall be carried out (as per recommended sequence of IEC 62052-11(Latest Edition) annexure-F on three (03) Nos. meters out of the total offered meters. If two meters fail in any of the above tests, the lot shall be rejected. If one of the meters fails to qualify any of the above tests, re-sampling shall be carried out, in case of failure of any of the tests the lot shall be rejected.

13.0 Inspection Procedure For Local Manufacturers

13.1 Routine Tests

Following routine tests shall be carried out on KWH, KW meters as per respective IECs by the manufacturer:

- Accuracy Test.
- Running with no load test.
- Starting current test.
- Insulation resistance test.

13.2 Sample Test

The meters offered for acceptance shall be grouped into lots containing upto 500 meters. A sample comprising ten meters shall be selected at random from each lot and eight meters be subjected to electrical test and two meters for mechanical test.

(i) Sample Test (Electrical)

(a) Following tests be performed on each of two selected sample meters:-

- o Impulse Test
- o Power Loss Test
- o Influence of Harmonics Test
- o DC and Even Harmonics Test
- o A.C. Voltage Test


(b) Following tests be performed on each of four selected sample meters:

- o Starting Current Test
- o Running with No Load Test (Creep Test)
- o Accuracy Test

(c) Following EMC tests be performed on each of two selected sample meters:

- o Fast Transient Burst Test
- o Surge Immunity Test
- o Electrostatic Discharge Test

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(ii) Sample Test (Mechanical)

(a) Following tests be performed on each of two meters already selected:

- o Impact Test
- o Tin Coating Test

(b) Following tests be performed on three meters selected randomly from offered lot.
Dimensional check be performed on one meter remaining two tests be performed on both the meters:

- o Dimensional Check
- o Shock and Vibration Test
- o Rain Fall Test

13.3 Acceptance Criteria

a) Electrical Test

- The lot shall be accepted if one meter fails in any one of the tests described in clause 13.2 (i)
- Re sampling of the same size shall be carried out if

One meter fails in any of the two tests

OR

Two meters fail in any one test

If any meter fails in any test during re-sampling, the entire lot shall be rejected.

- The lot shall be rejected if

Three or more meters fail in any of the test

OR

One meter fails in any three or more tests

OR

One meter fails in any two tests and one meter in one test.

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b) Mechanical Test

- The lot shall be accepted if meters qualify the above tests in clause 13.2 (ii)
- In case any meter fails in the relevant test, another sample of double the size shall be selected and test be repeated.
- If any meter fails in any test during re-sampling, the entire lot shall be rejected.

13.4 VERIFICATION FUNCTIONALITY TEST OF SOFTWARE

13.4.1 Verification test of the functionality of software and display features on offered meters shall be performed by loading/down loading of and auditing of the reports. Copy of the report be retained for official record. The number of meters shall be two. If any meter fails to comply with the functionality requirements, the entire offered lot shall be rejected.

14. WARRANTY

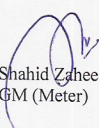
The supplier shall provide two years warranty for the successful operation and replacement free of cost.

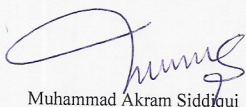
15. TRAINING

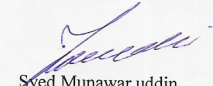
The successful bidder shall arrange a comprehensive practical training regarding programming billing, loading of software etc in Pakistan.

16. BID DATA, TEST CERTIFICATES, DRAWINGS, LITERATURE, REFERENCE LIST & MANUFACTURING EXPERIENCE

All the bidders shall submit complete technical data, detailed drawings test certificates, literature in English language, supply reference list and manufacturing experience alongwith the bid.


 Shahid Zaheer
GM (Meter)


 Muhammad Akram Siddiqui
GM (AMR)


 Syed Munawar uddin
GM (R&D)

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Annexure-A

Accuracy tests of single phase static meters for confirmation of security features as per clause 7.2 of KESC Specification No. K/R&D/SSP-22.

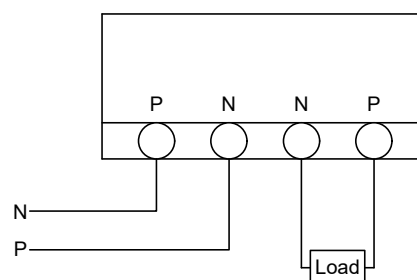
The inspection team of KESC will witness following tests on samples of single phase static meters offered for electrical tests as per clause 12.1.1 and 6.5.1.

These tests are necessary to confirm the security features as per clause 7.2.

Test No. 01.

Mains phase and neutral interchanges.

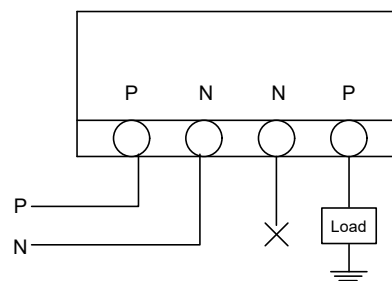
LEDs ⊙ ⊙ ● ⊙ ●
Earth Neutral Imp/Kwh Reverse Power
(ON)



Test No. 02.

Mains connected at normal position. Load earthed
Outgoing neutral not used.

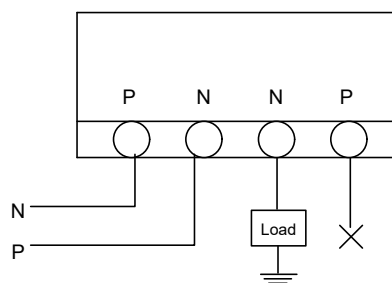
● ⊙ ● ⊙ ●
E N I R P
(ON) (ON) (ON)



Test No. 03.

Mains phase and neutral interchanged at in coming side.
Load connected at neutral of outgoing side, Load earthed.
Outgoing phase terminal not used.

● ⊙ ● ⊙ ●
E N I R P
(ON) (ON) (ON)



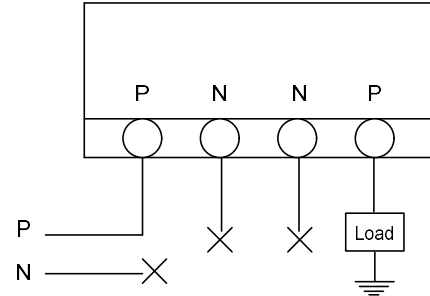
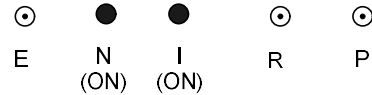
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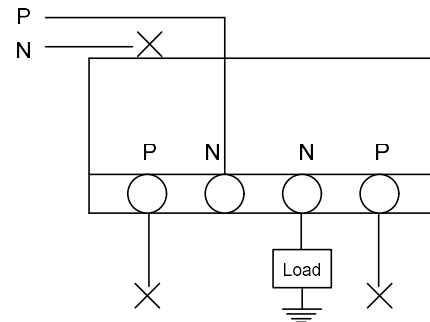
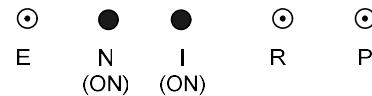
Test No. 4.

Mains phase at incoming phase terminal. Incoming neutral and outgoing neutral not used. Load between outgoing phase and earth.



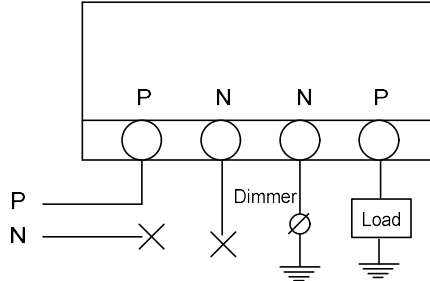
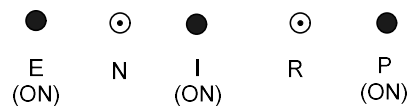
Test No. 5.

Mains phase at incoming neutral terminal. Incoming neutral missing. Incoming phase terminal and outgoing phase terminal not used. Load between outgoing neutral and earth.



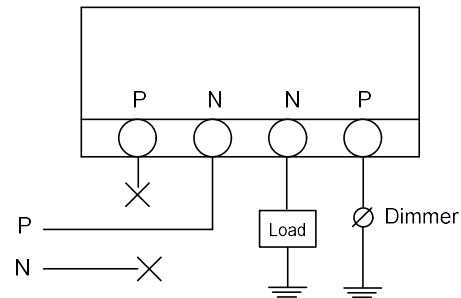
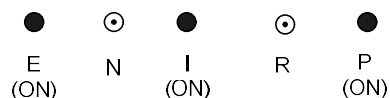
Test No. 6.

Mains phase at incoming phase terminal. Mains neutral missing. Load between outgoing phase and earth. Dimmer between outgoing neutral and earth.




Test No. 7

Mains phase at incoming neutral terminal. Mains neutral missing. Load between outgoing neutral and earth. Dimmer between outgoing phase and earth.



If any meter failed in any of above mentioned seven (07) tests, the total meters offered in inspection call shall be rejected accordingly.

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Annex - I Reference Standards

When following standards referred to in this document have been superseded, the latest revisions shall apply.

1. Metering Standards

a. IEC


- | | |
|-------------------------------|---|
| 62052-11:
(latest edition) | Electricity metering equipment (AC).
General requirements, tests and test conditions Part-11: Metering equipments. |
| 62053-21
(latest edition) | Electricity metering equipment (AC).
Particular requirements Part-21: Static meters for active energy (clauses 1 & 2). |
| 62053-23
(latest edition) | Electricity metering equipment (AC).
Particular requirements Part-23: Static meters for reactive energy (clauses 2 & 3). |

2. Electrical Testing Standards

a. IEC

- | | |
|-------------------------------|--|
| 60038
(latest edition) | IEC standard voltages.
50(301, 302, 303) : 1983, International Electro technical Vocabulary (IEV) Chapter 301: General terms on measurements in electricity. Chapter 302: Electrical measuring instruments. Chapter 303:Electronic measuring instruments. |
| 60060-1
(latest edition) | High voltage test techniques. |
| 60085
(latest edition) | Thermal evaluation and classification of electrical insulation. |
| 61000-4-2
(latest edition) | Electromagnetic compatibility (EMC)-Part 4: Testing & measurement techniques-section 2: Electrostatic discharge immunity test. |
| 61000-4-3
(latest edition) | Electromagnetic compatibility (EMC) – Part 4-3: Testing & measurement techniques-section 2: Radiated radio frequency electromagnetic field immunity test. |
| 61000-4-4
(latest edition) | Electromagnetic compatibility (EMC)-Part 4: Testing & measurement techniques-section 4: Electrical fast transient/burst immunity test. |
| CISPR22 | Information technology equipment-Radio disturbance characteristics-limits & methods of measurement. |

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3. Mechanical Testing Standards

a. IEC

60529 (latest edition) Degrees of protection provided by enclosures (IP code).

60695-2-11 (latest edition) Fire hazard testing, Part 2-11: Glowing/hot wire based test methods.

60817 (latest edition) Spring operated impact test apparatus and its calibration.

4. Environmental Standards

a. IEC

60068-2-1 (latest edition) Environmental testing, Part 2: Tests. Tests A: Cold.

60068-2-2 (latest edition) Basic environmental testing procedures, part 2: Tests. Tests B: Dry Heat.

60068-2-5 (latest edition) Basic environmental testing procedures, part 2: Tests. Test Sa: Simulated solar radiation at ground level.

60068-2-6 (latest edition) Environmental testing, part 2: Test. Test Fc: Vibration (sinusoidal).

60068-2-11 (latest edition) Basic environmental testing procedures, part 2: Tests. Test Ka: Salt mist.

60068-2-27 (latest edition) Basic environmental testing procedures, part 2 : Tests. Test Ea and guidance: Shock.


60068-2-30 (latest edition) Basic environmental testing procedures, part 2: Tests. Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle).

60721-1 (latest edition) Classification of environmental conditions. Part 1: Environmental parameters and their severities

60721-2-1 (latest edition) Classification of environmental conditions. Part 2: Environmental conditions appearing in nature. Temperature and humidity.

60721-2-4 (latest edition) Classification of environmental conditions. Part 2: Environmental conditions appearing in nature. Solar Radiation and temperature.

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Schedule of Technical Data
For Static Single Phase Two Wire Energy Meters Accuracy Class-1


A. General

- a) Bidder's name & Address _____
- b) Manufacturer's name & Address _____
- c) Manufacturing Experience _____

B. Energy meters


1. Model No./Type _____
2. Basic Current _____
3. Maximum current _____
4. Minimum starting current at Ref. Voltage & ref. Frequency _____
5. Operating voltage _____
6. Overload capacity _____
7. Accuracy class
i. KWh Meter _____
8. No. of elements _____
9. Detail of:
i. KWh part _____
10. Losses in
i. Potential Ckt _____
ii. Current Ckt _____
11. Encapsulation Details
i. Current Sensor _____
ii. Class of Insulation _____

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12. Max. current that meter can withstand during short circuit for 0.5 second. _____
13. Dielectric strength
- i. Impulse Voltage _____
- ii. AC test Voltage _____
14. Insulation resistance of meter _____
15. Material of:
- a. Base _____
- b. Cover _____
- c. Security Box _____
- d. Terminal block _____
- e. Terminals _____
- f. Printed Ckt Board _____
- (All the above shall be indicated on drawings to be supplied with the bid.)
16. Temperature rise of meter _____
17. Type of terminals _____
18. Centre to centre clearance between different phases
- a. Creepage Distance _____
- b. Clearance _____
19. Whether the meter is complaint to the Reference Standards for testing mentioned in Annex-I of the specs. _____
20. Operating ambient temp. range.
- a. Specified Operating Range _____
- b. Limit Range of Operation (Extreme Condition) _____
- c. Limit Range for Storage and Transport _____
21. Size & No. of digit of LCD Display. _____
22. What is the sampling rate. _____
23. IP class of meter _____

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24. No. of digits for following features; _____
- i. Kwh _____
25. What values / readings are _____
Controlled through resetting device?
26. Effect of external magnetic _____
Field as per IEC 62053-21
27. Effect of Radio frequency signals _____
28. Effect of Influence of DC and Even Harmonics _____
As per IEC 62053-21
29. Effect of other Influence Qty as per IEC _____
30. Type of Meter Memory _____
31. Storage capacity of memory _____
32. Time to retain the memory _____
33. In case of error in register _____
which types of checks are
provided which automatically
identifies the error.
34. Meter Clock: _____
- a) Source of operation of _____
built in clock.
- b) Effect of variation of _____
frequency of source
- c) Source of operation of _____
clock in case of power outage.
- d) If battery is used what _____
is the life of battery.
- e) Period / life for which the _____
battery can supply power
continuously to check and
register prior to its
discharge below 25%.


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- f) No. of programmable dates to account for holidays and week ends. _____
35. The Meter Programming/Reading Software is DOS or Windows _____
36. Name / Rating Plate;
Detail of information given on Name Plate _____
37. Attachments
- Whether the following material has been attached;
- a. Accuracy Curves _____
- b. Drawings of meter showing dimensions, mounting details etc. _____
38. Bidders / manufacturers have to supply all relevant drawings & technical literature duly marked. _____
39. Details of the deviations of the offered equipment from specification (use separate sheet if required). _____

Signature & Seal of
Bidder / Manufacturer

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Amendment No. 01

(January 30, 2015)

Following clauses have been revised, other text of the clauses shall remain same.

(Revised Text)

7.3 Back-up Battery

- The battery shall be welded, brazed or Soldered

(Revised Text)

7.2 Security Features

Every meter shall have a unique Sr. No. in its memory which can be displayed , the meter Sr. No shall be three Alpha and Five Numeric e.g. (SAZ12345)

(Revised Text)

7.4 Display

- Displayed meter Sr. No shall be three Alpha and Five Numeric e.g. (SAZ12345)

(Revised Text)

7.4.1 Display sequence shall be as under: -

- KE Number.
- KWH Reading.
- Previous month MD with “Prev” on top
- Current month MDI. with “Curr” on top
- Instantaneous Power KW “Inst” on top
- “OPENED” to be displayed along with all billing data.

(Revised Text)

9.0 Name & Rating Plate

9.1 A suitable name/rating plate shall be provided inside at the front of the meter, indicating the following information:


- **Month and year of Warranty Expiry**

(Revised Text)

10.0 Packing

Catalogue having brief description and technical data and installation instructions must be provided with each meter with their explanation

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12.4 **Standards Deleted**

13.4 **Standards Deleted**

Schedule of Technical Data For Static Single Phase Two Wire Energy Meters Accuracy Class-1

34. Meter Clock:

f) **Standards Deleted**

35. **Standards Deleted**

Following new Clauses/Sub-Clauses have been added in the specification.

5.3.5 Meter Security Box

- viii) Printing of Meter Serial No. on the inside of front cover and back plate of meter security box shall be in the same font, size and Style

8.0 Type Test

8.1.6 Selection of samples and type testing criteria shall be as per KE SOP K/D/R&D/500/2011 Rev (01) dated October 15, 2011(latest applicable)


8.1.7. All samples meters selected for type testing shall have three (03) decimal places in KW & KWh for verification of reading required for certain type tests.

8.1.8. Following details as mentioned below are to be provided before proceeding for type testing. Duly signed and stamped by the manufacturer.

a) Component list:

- i) Component Name
- ii) Part Number
- iii) Top Marking
- iv) Manufacturer Name
- v) Country of Origin
- vi) Grade (Commercial, Industrial etc)

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b) Drawings

- i) Meter Security Box
- ii) Meter housing
- iii) Meter ID plate Printed
- iv) Meter Sealing Strip
- v) Terminal Block
- vi) Current Terminal Blade
- vii) Current Terminal
- viii) Rag bolt nut & washer
- ix) Cardboard packing box
- x) Screw for current terminal fixing
- xi) Screw for PCB assembly to current blade fixing

c) Photographs

- i) All components as per attached list
- ii) Meter front view
- iii) Meter Base Assembly
- iv) PCB front view
- v) PCB rear view
- vi) Meter ID plate
- vii) Meter Packing Box

8.1.9 After successful completion of type test, at the time of conducting remaining type tests as described in Clause 7.2 & sub-clause 7.2.1 at manufacturer's works, components and drawings verification test as per list of components and drawings provided by manufacturer would also be carried out.

If the list of components list and drawings has any deviation with that of the type tested meter, than the type tests would be considered null and void.


13.0 Inspection Procedure for Local Manufacturers

13.2 Sample Test

(iii) Verification of components

Out of the 8 meters selected for electrical tests, one meter would be subjected to verification of components as per detail provided in clause 8.1.1 duly verified by TPRE & MTD

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13.3 Acceptance Criteria


c) Verification of components

If one meter subjected to verification of components test as per clause 13.2 fails, all meters offered against that particular inspection call would be considered as Failed & out rightly rejected.

17.0 List of Components used in manufacturing of meters having following information to be provided

- a) Part Name
- b) Manufacturer's Name
- c) Country of Origin
- d) Model No / Type
- e) Rating

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Amendment No. 02

(July 01, 2016)

Following clauses have been revised/added, other text of the clauses shall remain same.

(Original Text)

13.2 Sample Test

- (ii) Sample Test (Mechanical)
 - (a) Following tests be performed on each of two meters already selected:
 - o Impact Test
 - o Tin Coating Test
 - (b) Following tests be performed on three meters selected randomly from offered lot. Dimensional check be performed on one meter remaining two tests be performed on both the meters:
 - o Dimensional Check
 - o Shock and Vibration Test
 - o Rain Fall Test

(Revised Text)


13.2 Sample Test

- (ii) Sample Test (Mechanical)
 - (a) Following tests shall be performed on each of two meters already selected from offered lot as below:
 - Dimensional Check
 - Shock and Vibration Test
 - Terminal strip operation test (to verify the requirements as per clause 5.3.4)
 - Rain Fall Test
 - Opened indication verification test (test shall be performed by opening/removing polycarbonate cover of meter)
 - Impact Test (on polycarbonate meter cover)
 - Tin Coating & copper purity test for copper plates (as per clause 5.4)
 - (b) (Stand deleted)

(Original Text)

13.2 Sample Test

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(iii) Verification of components

Out of the 8 meters selected for electrical tests, one meter would be subjected to verification of components as per detail provided in clause 8.1.1 duly verified by TPRE & MTD

(Revised Text)

13.2 Sample Test

(iii) Verification of components

Out of the 8 meters selected for electrical tests, one meter would be subjected to verification of components as per detail provided in clause 8.1.8 duly verified by TPRE & MTD

(Original Text)

14.0 Warranty

The supplier shall provide the two year warranty for the successful operation and replacement free of cost.

(Revised and additional Text)

14.0 Warranty

14.1 The supplier shall provide two years warranty for the successful operation and new replacement free of cost.

14.2 All under warranty replaced meters will be subjected to routine sample test as per procedure.


14.3 The warranty period shall restart from the month / year, when the replaced meter is offered for sample/routine testing or supplied.

14.4 Vendor will be responsible to collect the Faulty Meter and deliver the replaced meter free of cost.

14.5 Replacement of meters shall be provided within 45 days after intimation.

14.6 The meter serial number and PO number shall be same for replaced meter (as of faulty meter) and all billing data shall be “Zero”

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(Original Text)

7.3 Back-up Battery

- Storage life of Battery shall be more than 15 years.

(Revised and additional Text)

7.3 Back-up Battery

- The life of battery shall be more than 15 years, if it is not providing power to LCD and RTC.
- The manufacturing date of battery shall not be more than one year from the date of inspection call/delivery.
- The manufacturer/bidder shall provide the test reports/ technical details/documents/data sheets confirming quality of offered battery as per requirements of this specification.

Following new Clauses/Sub-Clauses have been added in the specification.

7.4 Display:

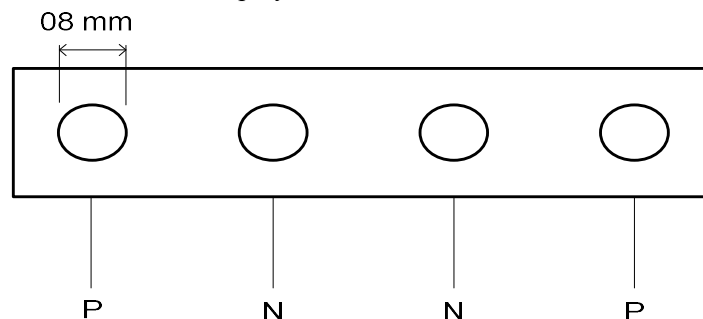
- The first three Alpha digits of LCD display shall be of 14 segments.

9.0 Name & Rating Plate

- The notice “**Breaking Seals or Tempering of Meter is an Offence**” shall be embossed or printed on front of meter polycarbonate cover/rating plate (with sticker on inside surface).


18.0 Cable In & Out Holes

- 18.1 Four separate holes of 8 (\pm 0.2) mm diameter each (as per below drawing), aligned with terminals shall be provided at the bottom of polycarbonate cover.



Bottom View of Meter

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19.0 Life of energy Meter:

19.1 The energy meter shall be designed for satisfactory performance in conditions as defined in clause 4.0 & 5.0 of this specification for upto 10 Years (minimum).

20.0 LCD Display & Real Time Clock (RTC):

20.1 The manufacturer shall ensure that the RTC/LCD display (without utility power of 6 hrs daily) shall be maintained for entire life of energy meter.

20.2 In case of failing to meet above said parameters/requirements, the manufacturer shall replace the faulty energy meter with new one free of cost during entire life of energy meter.

21.0 Opened indication:

21.1 Opened indication shall display on LCD as “OPENED” when meter polycarbonate cover is opened / removed.

21.2 The opened indication shall display on LCD along with all billing data as per clause 7.4.1 (Revised text) dated January 30, 2015.

22.0 Type Test Validity & Requirements:

22.1 The validity of type test shall be 03 years from the date of issuance of type test report.

22.2 The manufacturer has to declare the process of development of prototype meters along with the details of components (mentioning description, make/model origin etc) and manufacturing (foreign or locally) to KE before development prototype meters for type testing.

22.3 The prototype meters shall be developed in the presence of designated KE engineers and all processes will be explained and recorded. The same process will be followed for mass production of energy meters and will be verified by KE engineers during sample/routine testing.


22.4 In case of change of components or change in design, following type tests shall be performed and categorize as:

22.4.1 Category 1

22.4.1.1 Due to change in manufacturer and design of following components, complete prototype testing will be performed as per requirements of this specification at any independent lab of world repute under the witnessing of KE engineers.

- i. Micro controller unit (MCU)
- ii. Digital signal processor (DSP)
- iii. EEPROM
- iv. Voltage regulator
- v. Metal oxide varistor (MOV)
- vi. Printed circuit board (PCB)

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- vii. Clock oscillator
- viii. Current transformer (CT)
- ix. Potential transformer (PT)
- x. Liquid crystal display (LCD)
- xi. Modem

22.4.2 Category 2


22.4.2.1 Due to change in the assembly location codes of the following components without change of model, design & manufacturer, following tests shall be performed as per requirements of this specification at any independent lab of world repute under the witnessing of KE engineers

- i. Micro controller unit (MCU)
- ii. Digital signal processor (DSP)
- iii. EEPROM
- iv. Voltage regulator
- v. Metal oxide varistor (MOV)
- vi. Printed circuit board (PCB)
- vii. Clock oscillator
- viii. Current transformer (CT)
- ix. Potential transformer (PT)
- x. Liquid crystal display (LCD)

22.4.2.1.1 Detail of tests

- i. Impulse voltage test
- ii. AC voltage test
- iii. Accuracy test
- iv. Test of meter constant
- v. Test of starting condition
- vi. Test of non-load condition
- vii. Test of single phase load
- viii. Ambient temperature variation
- ix. Variation of voltage test
- x. Variation of frequency test
- xi. Reverse phase sequence
- xii. Unbalance voltage
- xiii. 5th harmonic contents in the current and voltage circuit
- xiv. Odd harmonics in the AC current circuit
- xv. Sub-harmonics in the AC current circuit
- xvi. Continuous magnetic induction of external origin 0.5 mT
- xvii. Test of power consumption
- xviii. Test of influence of supply voltage
- xix. Test of influence of short time over current
- xx. Test of influence of self heating
- xxi. Test of influence of heating
- xxii. Fast transient burst test
- xxiii. Test of immunity of electrostatic discharge
- xxiv. Surge immunity test

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22.4.3 Category 3

22.4.3.1 Due to change in design, model & manufacturer of backup battery, contractor/relay following tests shall be performed as per requirements of this specification at any independent lab of world repute under the witnessing of KE engineers

- i. Short time over current
- ii. Test of temperature influence of extreme condition
- iii. AC voltage test
- iv. Impulse voltage test
- v. Mechanical endurance test
- vi. Electrical endurance test
- vii. VA drop in current circuit
- viii. Surge immunity test

22.4.4 Category 4

22.4.4.1 Due to change in the approved design and model of following components, following tests shall be performed as per requirements of this specification at any independent lab of world repute under the witnessing of KE engineers

22.4.4.1.1 List of Mechanical Components

1. **Poly carbonate cover**
2. **Base plate**
3. **Sliding security strip**
4. **Current terminate & screws**
5. **Pressure plate**
6. **Terminal block**
7. **Nameplate**
8. **Load seals**
9. **Eye rag bolts**
10. **All types of electrical connection cables**
11. **Packing material**


1. **Poly carbonate**

- i. Dimensional test
- ii. Penetration of water and dust test
- iii. Spring hammer test
- iv. Heat and fire test
- v. Impact test

2. **Base plate**

- i. Dimensional test
- ii. Heat and fire test

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3. Sliding security strip

- i. Dimensional test
- ii. Heat and fire test

4. Current terminal and screws

- i. Dimensional test
- ii. Thickness & coating tests
- iii. Conductivity test

5. Pressure plate

- i. Dimensional test
- ii. Thickness of coating tests
- iii. Conductivity test

6. Terminal block

- i. Dimensional test
- ii. Deflection test (ISO 75)
- iii. Heat & fire test

7. Nameplate

- i. Dimensional test
- ii. Solar radiation test
- iii. Visual inspection

8. Lead seals

- i. Visual inspection
- ii. Material test

9. Eye rag bolts

- i. Dimensional test
- ii. Material test


10. All types of electrical connected cables

- i. Visual / dimensional test
- ii. Conductivity test

11. Packing material

- i. Visual / dimensional test
- ii. Quality assurance as per sample

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23.0 Printing of KE number/Meter Number:

23.1 Printing of KE number/Meter number should be of same patten (without hyphen “-“sign and space) as on LCD display ATB, Terminal strip and back side of meter.

24.0 Indicating LEDs:

24.1 Indicating LEDs shall be clear /visible from distance and centre aligned as per their holes.

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Amendment No. 03

(July 31, 2017)

Following clauses have been revised/added, other text of the clauses shall remain same.

(Original Text)

7.3 Back-up Battery

- The life of battery shall be more than 15 years, if it is not providing power to LCD and RTC.

(Revised & Additional Text)

7.3 Back-up Battery

- The shelf life of battery shall be more than 15 years.
- The minimum battery capacity shall be 1600 mAh. (More than one batteries can be used but their cumulative capacity should not be less than 1600 mAh).
- To check/test the healthiness of batteries installed in energy meters, batteries shall be checked/tested through battery analyzer / battery healthiness test equipment to check the initial voltage level of battery with 10 mA load for four second duration for activated batteries and then after to verify that if the battery retain its voltage level after removal of the load according to data sheet provided by battery manufacturers.
- The KE inspection team shall check/test the batteries as per above and sampling shall be done as per clause 13.2 (ii) (a) above.

(Original Text)

7.4 Display

Maximum demand should reset automatically on 1st of each month at 00.00 hrs. The meter shall display last month maximum demand and current month maximum demand respectively.


- Display shall be active in case of no power.

(Revised Text)

7.4 Display

Maximum demand should reset automatically on 1st of each month at 00.00 hrs. The meter shall display last month maximum demand and current month maximum demand respectively.

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- Display shall be active on demand through forward and reverse push button, in case of no utility power. The display sequence shall be as per clause 7.4.1.
- The LCD display should not remain active during power outages/absence of KE supply.

(Original Text)

8.0 Type Test

- 8.1** The type tests are intended to verify compliance of the characteristics of the meter with the relevant requirements of this specification. In case of any change of internal component in the currency of contract the type test shall be carried out a fresh. The tests shall be carried out at an independent Laboratory in the presence of KE engineers from TPRE & Meter Department. All expenditure regarding air ticket, boarding, lodging etc. shall be borne by the bidder. Criteria of selection of samples and acceptance / rejection shall be as per relevant IEC.

(Revised Text)

8.0 Type Test

- 8.1** The type tests are intended to verify compliance of the characteristics of the meter with the relevant requirements of this specification. In case of any change of internal component in the currency of contract the type test shall be carried out a fresh. The type tests shall be carried out at KEMA, CESI or any equivalent independent Laboratory. Type tests shall be performed under the witnessing of KE TPRE & Meter departments engineers (if required) and same will be decided during technical evaluation process.

(Additional Text)

10.0 Packing

The packed energy meters shall be supplied in form of bundle (wrapped), comprising of 10 Meters in one bundle in sequence number.

(Original Text)


13.2 Sample Test

(ii) Sample Test (Mechanical)

- (a)** Following tests shall be performed on each of two meters already selected from offered lot as below:

- Dimensional Check
- Shock and Vibration Test
- Terminal strip operation test (to verify the requirements as per clause 5.3.4)
- Rain Fall Test

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- Opened indication verification test (test shall be performed by opening/removing polycarbonate cover of meter)
- Impact Test (on polycarbonate meter cover)
- Tin Coating & copper purity test for copper plates (as per clause 5.4)

(Revised Text)

13.2 Sample Test

- (ii) Sample Test (Mechanical)
 - (a) Following tests shall be performed on each of two meters already selected from offered lot as below:
 - Dimensional Check
 - Shock and Vibration Test
 - Terminal strip operation test (to verify the requirements as per clause 5.3.4)
 - Rain Fall Test
 - Opened indication verification test (test shall be performed by opening/removing polycarbonate cover of meter)
 - Impact Test (on polycarbonate meter cover only)/As per WAPDA practices
 - Tin/Nickel Coating/plating
 - Battery healthiness test

(Additional Text)

13.3 Acceptance Criteria


- 13.3.1** If 20% lots (500 Units each) rejected in offered inspection call quantity, the whole offered inspection quantity (as of inspection call) shall be rejected. For example, if the inspection call is of 10,000 meters and for inspection, it has grouped in 20 lots of 500 energy meters each, the whole offered quantity against inspection call (10,000 units) shall be rejected if 04 lots out of 20 rejected as per criteria set in this specification.

(Original Text)

14.0 Warranty

- 14.1 The supplier shall provide two years warranty for the successful operation and new replacement free of cost.
- 14.5 Replacement of meters shall be provided within 45 days after intimation.
- 14.6 The meter serial number and PO number shall be same for replaced meter (as of faulty meter) and all billing data shall be “Zero”

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(Revised & Additional Text)

14.0 Warranty

- 14.1 The supplier shall provide three years warranty for the successful operation and new replacement free of cost with Zero “00”reading.
- 14.5 Replacement of meters shall be provided within 30 days after intimation.
- 14.6 The new serial number shall be provided for the under warranty claimed energy meters (Different than previous), however, PO number shall be same for replaced meter (against warranty).
- 14.7 The percentage of under warranty meters should not be more than 0.5% of total quantity against any PO of any manufacturer.

(Original Text)

19.0 Life of energy Meter:

- 19.1 The energy meter shall be designed for satisfactory performance in conditions as defined in clause 4.0 & 5.0 of this specification for upto 10 Years (minimum).

(Revised Text)

19.0 Life of energy Meter:

- 19.1 *Stands deleted*

(Original Text)

20.0 LCD Display & Real Time Clock (RTC):


- 20.1 The manufacturer shall ensure that the RTC/LCD display (without utility power of 6 hrs daily) shall be maintained for entire life of energy meter.

(Revised Text)

20.0 LCD Display & Real Time Clock (RTC):

- 20.1 *(Stands deleted)*
- 20.2 To maintain RTC, super capacitor shall be installed having capacity to maintain RTC without utility power for at least 07 days. After discharging of super capacitor, the RTC shall automatically shifted on the battery backup.

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20.3 To power up RTC, first priority shall be of KE power supply, second shall be super capacitors whereas, third priority shall be battery as back up source.

(Original Text)

22.0 Type Test Validity & Requirements:

22.1 The validity of type test shall be 03 years from the date of issuance of type test report.

22.4.4.1.1 List of Mechanical Components

8. Lead seals

- i. Visual inspection
- ii. Material test

9. Eye rag bolts

- i. Dimensional test
- ii. Material test

(Revised Text)

22.4.4.1.2 List of Mechanical Components

8. Lead seals

- i. Visual inspection
- ii. *Stands deleted*

9. Eye rag bolts

- i. Dimensional test
- ii. *Stands Deleted*

(Original Text)


Annexure-A

Accuracy tests of single phase static meters for confirmation of security features as per clause 7.2 of KESC specification No. K/R&D/SSP-22.

The Inspection team of KESC will witness following tests on samples of single phase static meters offered for electrical tests as per clause 12.1.1 and 6.5.1

(Revised & Additional Text)

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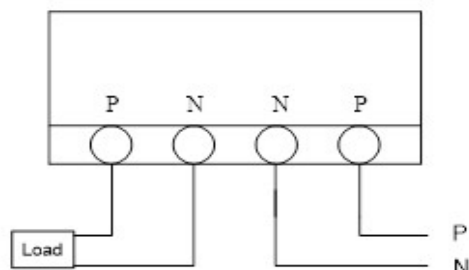
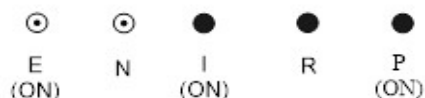
Annexure-A

Accuracy tests of single phase static meters for confirmation of security features as per clause 7.2 of KE specification No. K/R&D/SSP-22.

The Inspection team of KE will witness following tests on samples of single phase static meters offered for electrical tests as per clause 13.2 (i) (a) and 6.5.1

Test No. 8

by swapping the Mains and Load connections, the reverse LED should turn ON .



The acceptance criteria for all above mentioned Eight (08) tests shall be as per clause 13.3 above.

(Additional Clauses)

25.0 Bar code Provision:

25.1.1 Linear Bar Code (code 128) shall be provided (printed or sticker) on Meter Name/rating plate by encoding Unique meter serial no. as **ABC12345** on each energy meter provided by KE. The Numbers of Alpha & Numeric digits may vary as per need & requirement.

25.1.2 The bar code shall be provided on front side of rating plate of meter and on meter box at front side, which should be easily readable by scanner.

25.1.3 The bar code print should have the following properties:

- The print quality must be adequate for reading.
- Ink should be UV resistant and should not fade under sunlight.
- A space (quiet zone) of at least 5 mm should be left around the code.

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