



# NIGERIAN ELECTRICITY MANAGEMENT SERVICES AGENCY

(Formerly, Electricity Management Services Limited)

## NATIONAL METER TEST STATION

Alasia Bus - Stop, Oshodi, Lagos.



Federal Ministry of Power

CERTIFICATION NO.: NEMSA/NMISO/TTC/2022/086.

EXPIRY DATE: 04<sup>TH</sup> AUGUST, 2024.

## ELECTRICITY ENERGY METER TEST CERTIFICATE

**NAME OF APPLICANT:** ENEGASLONGMEN JV LTD.

**ADDRESS:** PLOT 434 MAGNUS ABE STREET, WUYE, ABUJA, NIGERIA.

**METER MANUFACTURER:** BUYI TECHNOLOGY CO. LTD.

**ADDRESS:** % CHINACORP GROUP LIMITED, 12F-8, NO. 41 NANKING W. ROAD, TAIPEI, TAIWAN 103.

**METER CERTIFICATION TYPE:** TYPE TEST

### METER PARTICULARS

**DESCRIPTION:**

**MAKE:** Three Phase Four Wire  
Smart Prepayment Energy Meter.

**TYPE DESIGNATION:** BY300

**CLASS:** 1.0

**RATED VOLTAGE:** 3×230/400V

**RATED CURRENT:** 3 × 5(100)A

**FREQUENCY:** 50Hz

**METER CONSTANT:** 1000imp/KWh

**REGISTER TYPE:** LCD

**APPLICATION:** Outdoor

**PROTECTION CLASS:** II

**MODE OF REGISTRATION:** Uni-Directional

**APPLICABLE STANDARD:**

The Energy Meter was tested based on the Requirements of:

NIS/IEC 62052-11(2020):Electricity Metering Equipment (a.c) General requirements, Tests and Conditions for Metering equipment.

NIS/IEC 62053-21(2020):Electricity Metering Equipment (a.c) Static Meters for Active Energy (classes 1 and 2).

Nigeria Metering Code (NMC) Version 02.

Nigerian Electricity Smart Metering Regulation (NESMR) Version 01.

**TEST LOCATION:** NATIONAL METER TEST STATION, OSHODI, LAGOS

**TEST CONDITIONS:** Temperature: 24.3°C, Humidity: 36%

**TEST MODE:** As received

**SCOPE OF TEST:** Covers evaluation of conformity to General/Constructional, Insulation, Accuracy, Electrical, Electro-magnetic, Mechanical and Climatic requirements.

### EXCLUSION FROM LIABILITY CLAUSE

This certification covers the meter(s) presented to NEMSA for certification, NEMSA is not liable for any tampering, alteration or modification that may occur after certifications.

CERTIFIED BY: ENGR SHUAIBY USMAN DESIGNATION: EDTS

SIGNATURE: [Signature] DATE: 11/8/2022



# ELECTRICITY ENERGY METER TEST CERTIFICATION RECORDS

TYPE OF METER: BY300.

MAKE OF METER: THREE PHASE FOUR WIRE SMART PREPAYMENT ENERGY METER.

SERIAL Nos: 0199300002821, 0199300002862 & 0199300002839.

NAME OF APPLICANT: ENEGASLONGMEN JV LTD.

ADDRESS: PLOT 434 MAGNUS ABE STREET, WUYE, ABUJA, NIGERIA.

METER MANUFACTURER: BUYI TECHNOLOGY CO. LTD.

ADDRESS: % CHINACORP GROUP LIMITED, 12F-8, NO. 41 NANKING W. ROAD, TAIPEI, TAIWAN 103.

Tested by: ENGR. ADEBAYO TINUOYE \*Design: M(TECH) Sign: [Signature] Date: 04/08/2022

Checked by: ENGR. SUNNY ADEOYE \*Design: STATION HEAD (NEMTSO) Sign: [Signature] Date: 04/08/2022

Reviewed by: ENGR. GIDEON FATUNMMI \*Design: AGM/HQMLSD Sign: [Signature] Date: 11/08/2022

Certified by: ENGR. SHUAIBU USMAN \*Design: EDTS Sign: [Signature] Date: 11/8/2022

This report relates ONLY to the tested meters.

**NOTE: This report is composed of Twenty-five (25) pages containing details of Test Results. It should not be reproduced except in full, without prior approval of NEMSA.**

\*DESIGNATION  
National Meter Test Station,  
Oshodi, Lagos.

NEMSA/NMTSO/TTC/2022/086



## **STATUTORY METER TEST AND CALIBRATION REQUIREMENTS**

Part 3, Section 3.1.2 of Nigeria Metering Code Version 02 requires that every Meter Type intended for the purpose of billing electricity consumers to be Type-tested and certified. This Type Test/certification is to be carried out by Nigerian Electricity Management Services Agency (NEMSA) as stipulated in the NEMSA-Act-2015.

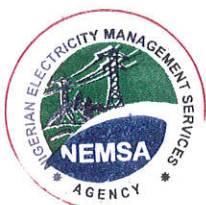
Meter Type: This is a particular design of Meter produced by one manufacturer having:

1. Similar metrological properties.
2. Same uniform construction of the parts that determine the properties.
3. Same ratio of maximum current to reference current

Type Test: A test conducted on a sample or samples of a Meter type to verify that its design and construction conform to the requirements of relevant standards.

**VALIDITY: 2 years from date of approval.**





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### SUMMARY OF TEST

S/N	TESTS	DONE	NOT DONE	REMARK
1	<b><u>Test of Insulation Properties</u></b> Impulse voltage test A.C withstand voltage test	✓ ✓		PASS PASS
2	<b><u>Test of Accuracy Requirements</u></b> Test of Meter constant Test of starting condition Test of No load condition <b><u>Test of Influence Quantities</u></b> Test of limits of errors due to current variation Test of influence of voltage variation Test of influence of frequency variation Test of influence of external magnetic field Test of influence of reversed phase sequence Test of influence of voltage unbalance Test of influence of harmonic components Test of repeatability of error	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓		PASS PASS PASS  PASS PASS PASS  PASS PASS PASS PASS
3	<b><u>Test of Electrical Requirements</u></b> Test of power consumption Test of influence of supply voltage Test of influence of short-time over current Test of influence of self-heating Voltage dips and short interruptions	✓ ✓ ✓ ✓ ✓		PASS PASS PASS PASS PASS
4	<b><u>Electromagnetic Compatibility Test</u></b> Fast transient burst test Test of immunity to conduct disturbance Test of immunity to electro-static discharge Surge immunity test Radio interference suppression Electromagnetic R.F field immunity test Damp oscillatory wave immunity test	✓	X X  X X X X	PASS
5	<b><u>Test of Effect of Climatic Environment</u></b> Dry heat test Cold test Damp heat cyclic test Solar radiation test	✓ ✓ ✓		PASS PASS PASS
6	<b><u>Mechanical Test</u></b> Spring hammer test Test of resistance to heat and fire Shock test Vibration test Test of protection against protection of dust Test of protection against penetration of water	✓ ✓		PASS PASS



## Conformity to General Construction and Component Specifications/ Requirements

S/N	Clause	Specifications/Requirements	EUT Conformity Assessment (Yes/No)
1	NMC(02), Appendix D, 4.4.1(1)	The Body of Meter shall be bakelite or polycarbonate	Yes
2	NMC(02), Appendix D, 4.4.1(2)	Terminal Block shall be made of Polycarbonate grade and shall form integral part of the Meter base.	Yes
3	NMC(02), Appendix D, 4.4.1(3)	Terminal Cover shall be transparent with external provision of sealing through sealing screws.	Yes
4	NMC(02), Appendix D, 4.4.1(5)	Meter shall have clearly visible, indelible and distinct name plate.	Yes
5	NMC(02), Appendix D, 4.4.1(6)	One seal shall be affixed on one side of Meter body.	Yes
6	NMC(02), Appendix D, 4.4.2(4)	<ul style="list-style-type: none"> <li>• Communication modules shall be compatible for two RS232/485 ports; one for optical port for communication with Meter reading instruments &amp; the other for hardware.</li> <li>• Provision of back-up Battery</li> </ul>	Yes Yes
7	NMC(02), Appendix D, 4.4.4	<p>On the Meter Name-Plate:</p> <p>Indelible Meter serial number shall not be more than twelve (12) digits and legibly printed.</p> <p>Bar code shall be printed below the Meter serial number.</p> <p>Manufacturer's Name and Trade mark.</p> <p>Place of Manufacture.</p> <p>Year of manufacture.</p> <p>Reference Voltage, Current and Frequency.</p> <p>Class index.</p> <p>Meter Constant.</p> <p>Owner/Utility's Identity.</p> <p>The Manufacturer shall affix one seal on one side of the Meter.</p> <p>The internal potential links shall be in closed position or link-less. Meters will be preferred and there shall not be any external link.</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>

### Conformity to Key Requirements

S/N	Clause	Key Requirements	EUT Conformity Assessment (Yes/No)
1	NMC(02), Appendix D, 4.4.6(15)	Flashing L.E.D. visible from the front window.	Yes
2	NMC(02), Appendix D, 4.4.6 (16)	IR port to transfer locally through Common Meter Reading Instrument (CMRI) or laptop.	Yes
3	NMC(02), Appendix D, 4.5.1	<p>The Meter shall have the following functions and features:</p> <p>Encryption Algorithm: Standard Transfer Specification (STS)</p> <p>Three level credit LED display on Front Panel indications</p> <p>Terminal: Extended cover type with external connection diagram on the inside.</p> <p>Terminal Hole Diameter: Not less than 9.0 mm.</p> <p>Casing material: Fire retardant-Polycarbonate.</p> <p>Adequate sealing provision to prevent tampering,</p>	<p>Yes</p> <p>No</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>
4	NMC(02), Appendix D, 4.5.1	The Meter shall conform to 20 digits encryption credit transfer number.	Yes
5	NMC(02), Appendix D, 4.5.1	Casing/Cover Material: Fire resistant-bakelite or polycarbonate	Yes
6	NMC(02), Appendix D, 4.6.1(xiv)	<p>The Meter shall have a Display of:</p> <ul style="list-style-type: none"> <li>• 6 digit display</li> <li>• 9.0 mm× 4.5 mm</li> </ul>	<p>Yes</p> <p>Yes</p>
7	NMC(02), Appendix D, 4.7	<p>The Display Unit shall be capable of displaying the following parameters for electricity/prepayment information:</p> <p>Total units used to date (in KWh)</p> <p>Available credit (in KWh)</p> <p>Present Consumption rate</p> <p>Last billing date</p> <p>Last billed amount</p> <p>Credit level</p> <p>Warning on credit level</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>



### Load Survey Capability

S/N	Clause	Requirements	Conformity Assessment (Yes/No)
1	NMC(02), Appendix D, 4.4.3	The Meter shall log minimum of 225 tamper events, compartment-wise division of each event and their persistence time shall be indicated.	Yes
2	NMC(02), Appendix D, 4.5.1	The Meter shall be capable of recording and displaying: <ul style="list-style-type: none"> <li>Total KWh used in the past 24hrs</li> <li>Total KWh used in the past 30 days.</li> </ul>	Yes Yes

### Tamper/Fraud Detection Capability

S/N	Clause	Requirements	Conformity Assessment (Yes/No)
1	NMC(02), Appendix D, 4.4.3	<ul style="list-style-type: none"> <li>Phase sequence reversal: The Meter shall work accurately irrespective of the phase sequence of supply.</li> <li>Missing Potential: The date and time of such occurrence and restoration shall be recorded by the Meter.</li> <li>Reversal of current coil polarity: The Meter shall record the date and time of occurrence and restoration. Meter shall however, register the energy consumed correctly with any one, two or all three current coil reversals.</li> <li>Phase association disturbance: The Meter shall record the date and time of occurrence and restoration. Meter shall however, register the energy consumed correctly with two or three misaligned phases.</li> <li>Current coil shorting: The Meter shall record the date and time of occurrence and restoration. The threshold of the current shall be programmable.</li> <li>Meter shall log all three phase voltage, current, power factor etc. at the time of tamper attempt for all such occurrences.</li> </ul>	Yes  Yes  Yes  Yes  Yes

### Conformity to Basic Requirements

S/N	Clause	Properties	Standard	Conformity Assessment (Yes/No)
1	NESMR (01), SECTION 7.1.6	<ul style="list-style-type: none"> <li>Voltage Rating</li> <li>Operating Range</li> </ul>	<ul style="list-style-type: none"> <li>3×230/400V</li> <li>−15% to +15% <math>V_{ref}</math>.</li> </ul>	Yes Yes
2	NESMR (01), SECTION 7.1.6	Current Rating	3×5(100)A	Yes
3	NESMR (01), SECTION 7.1.6	Frequency	50Hz ± 5%	Yes
4	NMC(02), Appendix D, 4.5.1	Power Factor Range	−1 to +1	Yes
5	NESMR (01), SECTION 7.1.6	<ul style="list-style-type: none"> <li>Operating Temperature</li> <li>Storage Temperature</li> </ul>	<ul style="list-style-type: none"> <li>−40°C to +70°C</li> <li>Up to 70°C</li> </ul>	Yes Yes
6	NMC(02), Appendix D, 4.5.1	Average Relative Humidity	95% at 45°C non-condensing	Yes
7	NMC(02), Appendix D, 4.5.1	Life Span	Minimum of 10 years	Yes



## 1.0 TEST OF INSULATION REQUIREMENTS

### 1.1 A.C Voltage Test

**Requirement:** NIS/IEC 62052-11 (2020)

**Test Equipment:** CHAUVIN ARNOUX C.A 6150

This test was performed with the three samples.

**Test Method:** The test was carried out in accordance with NIS/IEC 62052-11

A test voltage of 4KVrms was applied between all voltages, current and auxiliary circuits whose reference voltage is over 40V connected together and earthed at frequency of 50Hz, while 2KVrms was applied between circuits not intended to be connected together in service.

**Test Result:** No sign of flash over, disruptive discharge or puncture was observed.

### 1.2 Impulse Voltage Test

**Requirement:** The test was carried out in accordance with NIS/IEC 62052-11.

**Test Equipment:** EMTEST/VSS500NE

This test was performed with the three samples.

**Test Method:** An impulse voltage was applied ten times with one polarity and then repeated with other polarity. The minimum time between the impulses was 3 seconds.

**Test Result:** No sign of flash over or puncture was observed on the meter and change in percentage error of reference condition did not exceed the limit of variation in percentage error.





## 2.0 TEST OF ACCURACY REQUIREMENTS

### 2.1 Test of Meter Constant

**Requirement:** NIS/IEC 62053-21 (2020)

**Test Equipment:** PPS 3.3C and ZERA MT310

This test was performed with meter no. 0199300002821.

**Test Method:** The reference frequency: 50Hz, reference voltage: 230V, and basic current: 5A were applied.

**Test Result:** The relationship between the test output and the indication on display was confirmed to correspond with the marking on the name plate.

### 2.2 Test of Starting Condition

**Requirement:** NIS/IEC 62053-21

**Test Equipment:** PPS 3.3C and ZERA MT310

This test was performed with meter no. 0199300002821.

**Test Method:** The reference frequency: 50Hz, reference Voltage: 230V, and basic current: 5A were applied at unity power factor.

**Test Result:** When connected to  $V_{ref}$  and current equal to  $0.4\% I_b$  at unity power factor, the meter started and continued to register.

The Meter meets the requirement.

### 2.3 Test of No-Load Condition

**Requirement:** NIS/IEC 62053-21

**Test Equipment:** PPS 3.3C and ZERA MT310

This test was performed with meter no. 0199300002821.

**Test Method:** The Current Circuit of the meter was open-circuited and a voltage of 115%  $V_{ref}$  applied.

**Test Result:** The Meter did not produce more than one pulse output and was fully operational within five seconds after rated voltage was applied. The Meter meets the requirement.

### 2.4 Test of Influence Quantities

#### 2.4.1 Test of Limits of Errors due to Current Variation

**Requirement:** NIS/IEC 62053-21

**Test Equipment:** PPS 3.3C and ZERA MT310

This test was performed with meter no. 0199300002821.

**Test Method:** The variation in percentage errors was checked at reference frequency: 50Hz, reference Voltage: 230V and the current values listed below:

Current	Power factor	Permissible error limits (%)	Test Results
5% $I_b$	1	$\pm 1.5\%$	+ 0.06%
10% $I_b$	1	$\pm 1.0\%$	+ 0.05%
$I_b$	1	$\pm 1.0\%$	+ 0.03%
$I_{max}$	1	$\pm 1.0\%$	+ 0.01%
10% $I_b$	0.5	$\pm 1.5\%$	+ 0.17%
20% $I_b$	0.5	$\pm 1.0\%$	+ 0.16%
$I_b$	0.5	$\pm 1.0\%$	+ 0.10%
$I_{max}$	0.5	$\pm 1.0\%$	- 0.11%
10% $I_b$	0.8	$\pm 1.5\%$	+ 0.10%
20% $I_b$	0.8	$\pm 1.0\%$	+ 0.09%
$I_b$	0.8	$\pm 1.0\%$	+ 0.07%
$I_{max}$	0.8	$\pm 1.0\%$	- 0.04%
<b>Test Conclusion</b>			<b>Pass</b>

### 2.4.2 Test of Influence of Voltage Variation

**Requirement:** NIS/IEC 62053-21

**Test Equipment:** PPS 3.3C and ZERA MT310

This test was performed with meter no. 0199300002821.

**Test Method:** The variation in percentage errors was checked at  $-15\%$  to  $+15\%$   $V_{ref}$ ,  $F_{ref}$  and  $I_b$  at Unity and 0.5 Power Factor.

**Test Result:**

Power factor	Voltage	Limits	Test Results
1	85% $V_{ref}$	$\pm 0.7\%$	0.00%
1	115% $V_{ref}$	$\pm 0.7\%$	- 0.01%
0.5	85% $V_{ref}$	$\pm 1.0\%$	- 0.02%
0.5	115% $V_{ref}$	$\pm 1.0\%$	0.00%
<b>Test Conclusion</b>			<b>Pass</b>

### 2.4.3 Test of Influence of Frequency Variation

**Requirement:** NIS/IEC 62053-21

**Test Equipment:** PPS 3.3C and ZERA MT310

This test was performed with meter no. 0199300002821.

**Test Method:** The variation in percentage errors was checked at  $F_{ref} \pm 5\%$   $F_{ref}$ ,  $V_{ref}$ , and  $I_b$  at Unity and 0.5 Power Factor.

**Test Result:**

Power factor	Frequency (Hz)	Limits	Test Results
1	95% $F_{ref}$	$\pm 0.5\%$	0.00%
1	105% $F_{ref}$	$\pm 0.5\%$	- 0.01%
0.5	95% $F_{ref}$	$\pm 0.7\%$	- 0.02%
0.5	105% $F_{ref}$	$\pm 0.7\%$	- 0.01%
<b>Test Conclusion</b>			<b>Pass</b>



#### 2.4.4 Test of Influence of Reverse Phase Sequence

**Requirement:** NIS/IEC 62053-21

**Test Equipment:** PPS 3.3C and ZERA MT310

This test was performed with meter no. 0199300002821.

**Test Method:** The change in the error with reversed phase sequence was compared with the error with normal phase sequence measured at  $V_{ref}$ ,  $F_{ref}$ , 10%  $I_b$  at Unity Power Factor.

**Test Result:** The worst case change in error was + 0.02%.  
The maximum permissible change allowed is 1.5%.

The meter meets the requirement.

#### 2.4.5 Test of Voltage Unbalance

**Requirement:** NIS/IEC 62053-21

**Test Equipment:** PPS 3.3C and ZERA MT310

This test was performed with meter no. 0199300002821.

**Test Method:** The influence of interruption of one phase of the three phase network and interruption of two phases were checked at  $V_{ref}$ ,  $F_{ref}$ ,  $I_b$  at Unity Power Factor.

**Test Result:** The accuracy of the meter under the influence of interruptions of one of the three phases and two of the three phases were + 0.10% and + 0.19% respectively.

The maximum permissible change allowed is 2.0%.

The meter meets the requirement.

### 2.4.6 Test of Influence of Harmonic Components in the Current and Voltage Circuits

**Requirement:** NIS/IEC 62053-21

**Test Equipment:** PPS 3.3C and ZERA MT310

This test was performed with meter no. 0199300002862.

**Test Method:** 10% of fifth harmonic was added to the voltage and 40% of fifth harmonic was added to the current at  $0.5 I_{max}$ ,  $V_{ref}$  and Unity Power Factor. The variation in percentage error was measured under the fifth Harmonic and compared with the fundamental error.

**Test Result:** The worst change in error was +0.02%

The maximum permissible change allowed is  $\pm 0.8\%$ .

The meter meets the requirement.

### 2.4.7 Repeatability of Error Test

**Requirement:** NIS/IEC 62053-21

**Test Equipment:** PPS 3.3C and ZERA MT310

This test was performed with meter no. 0199300002862.

**Test Method:** The meter was connected to  $V_{ref}$  and the accuracy measured at time interval of 5 minutes at Unity Power Factor, taking 24 error samples.

**Test Result:**

Current	Permissible Error Variation	Test Results
$5\%I_b$	$\pm 0.5\%$	0.00%
$10\%I_b$	$\pm 0.5\%$	- 0.01%
$I_b$	$\pm 0.5\%$	- 0.01%
$I_{max}$	$\pm 0.5\%$	0.00%
<b>Test Conclusion</b>		<b>Pass</b>

### 3.0 TEST OF ELECTRICAL REQUIREMENTS

#### 3.1 Test of Power Consumption

**Requirement:** NIS/IEC 62053-21

**Test Equipment:** PPS 3.3C and ZERA MT310

This test was performed with meter no. 0199300002862.

**Test Method:**

**In Voltage Circuit:** Voltage circuit was connected to rated voltage and the current circuit kept open. The power consumption was recorded.

**In Current Circuit :** Current equal to  $I_b$  was injected into the current circuit while voltage circuit was kept open. The power consumption was recorded.

**Test Result:**

Test Circuit	Limit	Test Result
Voltage	1W, 10VA	< 1W & 10VA
Current	1W	0.02W
Test Conclusion		Pass



### 3.2 Voltage Dips and Interruptions

**Requirement:** NIS/IEC 62052-11

**Test Equipment:** PPS 3.3C

This test was performed with meter no. 0199300002862.

**Test Method:** The meter was in operating condition with auxiliary circuits energized with reference voltage while the current circuit was left open.

**Test Result:**

Test Parameters	Requirements	Test Result
Voltage interruption of $V_{ref}$ : 100% Interruption time: 1 second No. of interruptions: 3 Restoration time between interruptions: 50 milliseconds	(i) Change produced in register not more than 0.06KWh.	Pass
	(ii) No loss of data in memory.	Pass
Voltage interruption of $V_{ref}$ : 50% Interruption time: 20 milliseconds No. of interruptions: 1	(i) Change produced in register not more than 0.06KWh	Pass
	(ii) No loss of data in memory.	Pass
Voltage interruption of $V_{ref}$ : 50% Dip time: 1 minute No. of dip: 1	(i) Change produced in register not more than 0.06KWh	Pass
	(ii) No loss of data in memory.	Pass
<b>Test Conclusion</b>		<b>Pass</b>

### 3.3 Short Time Over-Current Test

**Requirement:** NIS/IEC 62053-21

**Test Equipment:** STOC-1

This test was performed with meter no. 0199300002821.

**Test Method:** The current 30 times  $I_{max}$  was passed for one half cycle with rated voltage applied.

**Test Result:**

Current	Power Factor	Limits of Variation	Test Results
$I_{max}$	1	$\pm 1.5\%$	+0.01%
<b>Test Conclusion</b>			<b>Pass</b>

The meter performed correctly when compared to its initial working condition.

### 3.4 Test of Influence of Self -Heating

**Requirement:** NIS/IEC 62053-21

**Test Equipment:** PPS3.3C and ZERA MT310

This test was performed with meter no. 0199300002821.

**Test Method:** The voltage circuit was energized at  $V_{ref}$  for 2 hours without any current in the current circuit.  $I_{max}$  was then applied at Unity Power Factor and 0.5 Power Factor. The error was read and recorded immediately.

**Test Result:**

Power Factor	Limits of Variation	Test Results
1	$\pm 0.7\%$	+ 0.01%
0.5	$\pm 1.0\%$	- 0.11%
<b>Test Conclusion</b>		<b>Pass</b>

#### 4.0 ELECTROMAGNETIC COMPATIBILITY TEST

##### 4.1 Electrostatic Discharge Test

**Requirement:** NIS/IEC 62052-11

**Test Equipment:** EMTEST P30N

This test was performed with meter no. 0199300002839.

**Test Method:** With the voltage and auxiliary circuits energized with reference voltage with current circuit left open. Air discharge was applied with test voltage of 15KV and 10 pulses for positive and negative polarity.

**Test Result:** The electrostatic discharges did not cause any disturbances to the meter functions.

The meter meets the requirement.

#### 5.0 TEST OF EFFECT OF CLIMATIC ENVIRONMENT

##### 5.1 Dry Heat Test

**Requirement:** NIS/IEC 62052-11

**Test Equipment:** GTH-100

This test was performed with meter no. 0199300002839.

**Test Method:** The Meter was mounted in a non-operating condition at a temperature of  $70^{\circ}\text{C} \pm 2^{\circ}\text{C}$  for duration of 72hrs.

**Test Result:** No sign of damage or change of information was observed. The Meter performed correctly.

The meter meets the requirement.



## 5.2 Cold Test

**Requirement:** NIS/IEC 62052-11

**Test Equipment:** GTH-100

This test was performed with meter no. 0199300002839.

**Test Method:** The Meter was energized with reference voltage while the current circuit was open circuited. It was then subjected to  $-25^{\circ}\text{C} \pm 3^{\circ}\text{C}$  for duration of 72hrs.

**Test Result:** After the test, no sign of damage was observed. The Meter performed correctly.

The meter meets the requirement.

## 5.3 Damp Heat Cyclic Test

**Requirement:** NIS/IEC 62052-11

**Test Equipment:** GTH-100

This test was performed with meter no. 0199300002839.

**Test Method:** The voltage and auxiliary circuits of the meter were energized with reference voltage without any current. The test was conducted at upper temperature of  $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$  for duration of 6 cycles. 24hrs after the test, the meter was subjected to the following tests:

- Impulse test using 0.8 of normal test voltage.
- Functional test requiring examination of the meter for damage, change of information or impairment to operation.

**Test Result:** No sign of damage was observed. The Meter performed correctly.

The meter meets the requirement.

## 6.0 TEST OF MECHANICAL REQUIREMENTS

### 6.1 Spring Hammer Test

**Requirement:** NIS/IEC 62052-11

**Test Equipment:** GMBH F22.50

This test was performed with meter no. 0199300002839.

**Test Method:** The meter was mounted in its normal working condition and the spring hammer was made to act on the outer surface of the meter cover including windows and on the terminal cover with a kinetic energy of  $0.2J \pm 0.02J$ .

**Test Result:** There is no crack on the meter case. This showed that the mechanical strength of the meter case is adequate. The meter meets the requirement.

### 6.2 Test of Resistance to Heat and Fire (Glow Wire Test)

**Requirement:** NIS/IEC 62052-11

**Test Equipment:** GWT-5

This test was performed with meter no. 0199300002862.

**Test Method:** The terminal block, Terminal cover and case were brought separately into contact with the glow wire. The temperature of the glow wire for terminal block was  $960^{\circ}C$  and  $650^{\circ}C$  for terminal cover and base.

**Test Result:**

Test Part	Temperature Requirement	Test Result
Terminal Block	$960^{\circ}C$	Pass
Terminal Cover	$650^{\circ}C$	Pass
Meter Case	$650^{\circ}C$	Pass
<b>Test Conclusion</b>		<b>Pass</b>

The meter meets the requirement.

## 7.0 STARTING CURRENTS AND PERMISSIBLE LIMITS OF ERRORS

### 7.1 Permissible Limits of Errors due to Current Variation for Meter of Class 1.0

#### Unity Power Factor

S/N	Test Current	Permissible Error Limit
1	5% $I_b$	$\pm 1.5\%$
2	10% $I_b$	$\pm 1.0\%$
3	$I_b$	$\pm 1.0\%$
4	$I_{max}$	$\pm 1.0\%$

#### 0.5 Lagging Power Factor

S/N	Test Current	Permissible Error Limit
1	10% $I_b$	$\pm 1.5\%$
2	20% $I_b$	$\pm 1.0\%$
3	$I_b$	$\pm 1.0\%$
4	$I_{max}$	$\pm 1.0\%$

#### 0.8 Leading Power Factor

S/N	Test Current	Permissible Error Limit
1	10% $I_b$	$\pm 1.5\%$
2	20% $I_b$	$\pm 1.0\%$
3	$I_b$	$\pm 1.0\%$
4	$I_{max}$	$\pm 1.0\%$

#### Repeatability of Error Test

S/N	Test Current	Error Variation Limit
1	5% $I_b$	$\pm 0.5\%$
2	10% $I_b$	$\pm 0.5\%$
3	$I_b$	$\pm 0.5\%$
4	$I_{max}$	$\pm 0.5\%$

#### Starting Current

	Class 1
Direct Connection	0.4% $I_b$





Above is a photograph of BUYI TECHNOLOGY CO. LTD & ENEGASLONGMEN JV LTD Three Phase Four Wire Smart Prepayment Energy Meter with terminal cover open.





Above is a photograph of BUYI TECHNOLOGY CO. LTD & ENEGASLONGMEN JV LTD Three Phase Four Wire Smart Prepayment Energy Meter with extended terminal cover.





*Above is a photograph of BUWI TECHNOLOGY CO. LTD & ENEGASLONGMEN JV LTD Three Phase Four Wire Smart Prepayment Energy Meter Customer Interface Unit (CIU).*