TERMS OF REFERENCE (TOR)

1. DESCRIPTION:

PROCUREMENT, SUPPLY AND DELIVERY OF SUBSTATION TESTING EQUIPMENT

2. APPROVED BUDGET FOR THE CONTRACT (ABC):

The total Approved Budget of the Contract (ABC) of **Three Million Pesos (₱ 3,000,000.00)** inclusive of all taxes.

3. SOURCE OF FUND:

NEA Corporate Operating Budget FY 2023 from the Capital Outlay under Technical Equipment

4. TECHNICAL EQUIPMENT TO BE PROCURED:

a. **One (1) unit of 3-Phase Transformer Turns Ratiometer**
b. **One (1) unit of Transformer Ohmmeter**
c. **One (1) unit of Power Quality Analyzer**

5. LEGAL BASIS:

a. Pursuant to Section 5 of the Implementing Rules and Regulations (IRR) of RA 10531, the National Electrification Administration (NEA) is mandated to provide technical assistance to Electric Cooperatives (ECs) to strengthen their technical capability and to ensure the quality of electricity service consistent with the standards provided in the EPIRA, Philippine Distribution Code (PDC), Philippine Grid Code (PGC), Philippine Electrical Code (PEC), and other relevant laws and standards.

b. NEA Approved Annual Procurement Plan FY 2023

6. OBJECTIVE:

To carry out the mission statement of the Engineering Department consistent with the NEA's Mission and Vision

7. TECHNICAL SPECIFICATION:

1. 3-Phase Digital Transformer Turns Ratiometer Tester

a. Scope

This Specification covers the requirement of three (3)-phase fully automated measurement Transformer in a Substation and manufacturing Environment of Turn ratio, Excitation Current, Phase Angle displacement, Magnetic balance of Power, Instrument, and Distribution

b. General Requirement

The Equipment shall have automatic measurement of 3 phase step up switching method facility for turns ratio & voltage ratio with Phase Displacement (in both degree and cent radian), Polarity, %Error, Excitation current, and magnetic Balance tests in it.

The equipment should have an onboard Controller with GUI-supported software and dedicated Software reporting for All instruments of same make with PC/external Computer or laptop.

The software should be capable of performing in all type of winding like star-star, star-delta, delta-delta, zig zag etc., and Each Test report with Graphical representation with complete information, should indicate %Error vs name plate with pass/fail limit, Ability to measure & expected phase Shift, Magnetic balance/ Flux distribution Test Results in PDF & Xml format.

The Equipment should be Equipped with manual switch in build in it. once entering transformer nameplate information and run through an OLTC with manual click. It should confirm the calculated tap voltages and choose when the test should stop & have for single person operation to perform the test with Load Tap Changer Quickly

The Equipment should have colored display with touch screen facility with display calibration on it to check touch screen and must have option to increase or decrease the brightness. The software should have option to enter date and time.

The software should have measurement & limits options for Magnetic imbalance unit, Ratio error limit, phase deviation limit with a test buzzer in unit, speaker for countdown for Turns ratio test, Warning indicator on kit.

The Equipment should have IEEE C57.152-2013 IEC 60076-1:2011 AS/NZS 6076 1:2014 CIGRE 445 2011 Transformer Testing.

The equipment should have Trouble free operation in charged switchyards under electrostatic & magnetic interference condition.

The equipment should have capability to perform magnetic balance test & Excitation current up to 1000mA

c. Technical Requirement

Measurement Voltage: 1 phase step up induced voltage up to 125 V RMS Automatic & User Selectable

Input Power
90-264VAC, 47-63Hz, 250VA Max

Output Voltage: 1Ø, 1 - 48VAC,
- up to 125V induced on Primary
- Frequency: 50-480Hz
- Current: 0.1mA - 1A, Max 1A @ 48V

Excitation Current:
1mA to 1000 mA or Higher Resolution: 4 digits
0.1mA 0.1 mA - 100mA
1mA 101-1000mA
Accuracy: ± 1% ±0.1 mA

Turn Ratio Range and Accuracy:
Step Down Excitation
25-48V:
±0.05% 0.8 – 1000
±0.10% 1001 - 2000
±0.30% 2001 – 15000
±1% 15001 – 50000
1-24V
±0.10% 0.8 – 1000
±0.20% 1001 – 2000
±0.60% 2001 – 15000

Step Up Measurement
25-125V
±0.05% 0.8 - 200 (most Power Tx)
1-24V
±0.10% 0.8 – 200
5 digit or better resolution

Phase Angle: Range: 0 - 360 Degrees Accuracy: ± 0.05 Degrees

Power Supply: 90-264VAC, 47-63Hz, 250VA Max

Humidity: 0 to 90% or better none condensing

Operating Temperature: -20 °C to + 50 °C

Storage Temperature: -30 °C to +70 °C

Interface: Should have suitable interface with USB

Weight: Not more than 6.8 kg without accessories.

Display: The equipment shall have min. 7-inch full Colour display contain min. 800x480 resolution. Running custom GUI with touch screen facility on it.

Memory: Should have enough memory to Store at least 2000 sets of 3 phase results and test setup there shall be provision to export data in to open data format in xml & direct PDF format.

Software: Should have the facility to interface with PC/External computer with GUI software for configuration by user selectable standards of test for testing & Report Generation in PDF format & software should indicate %Error vs name plate with pass/fail limit.

Safety: Kit should have an emergency Button. kit Should full fill safety requirement as per relevant safety standards

Accessories:

It should have the 3Ø Universal lead set up to 9 meter simplifies connecting to any transformer. The durable of kelvin clamps extend should be up to 3 inch for connecting to any bushing size. Lead spans range up to 30m (100ft), ensuring you can connect and test any transformer configuration. All the leads can be connected in one ladder climb, reducing the risk of fall injuries. The kelvin clamps also accept safety banana plugs, making it easy to connect the 3Ø lead set to a CT terminal block. Electrical shock and potential markings are clearly displayed on the clamp, informing operators how to connect safely and securely. Transit Case should be provided with the kit.

Others:

End-user-Training

2. Digital Transformer Ohmmeter Tester

a. Scope

The Equipment offered shall be line-operated, field-portable designed specifically to measure the dc resistance of all types of magnetic winding safely and accurately

b. General Requirement

The Equipment should be capable of measuring winding resistance of small distribution, Power, Auto Transformer in live switchyard & factory Environment.

The equipment shall have two measuring channels which allows simultaneous testing of primary and secondary winding.

The equipment should use classic Kelvin's method to measure resistance so that need of lead resistance compensation is eliminated.

it should quickly overcome the inductance offer by large inductive winding and make current stabilize very fast.

It should also check any discontinuity in the tap changer while changing the tap from one position to another and should have MAKE BEFORE BREAK sequence reorganization feature with indicator & LTC Make break transition 2ms,20ms,50ms & 80ms

It should have protection against the back emf offered by large transformer, consist of very fast discharge time & should able to display %current stability

The equipment shall have Built-in demagnetization circuitry allows the operator to de-magnetize the transformer core, either before or upon completion of resistance testing, or as a standalone feature

The equipment to be supplied with remote trigger switch for testing transformers with tap-changers

The equipment should have Trouble free operation in charged switchyards under electrostatic & magnetic interference condition

There shall be provision of operation via PC/External Computer with user-friendly software along with facility of automatic temperature correction setting, test data printing facility in relevant format.

The equipment shall have internal memory for storage dataset records, for later recall. The equipment shall also supply with software for down load and report generation

The Equipment shall have facility of continuous operation with graphical presentation of measured winding resistance per tap and test current change detector

c. Technical Requirement

Channel	:	2 channel
Display & Operation	:	LCD display
Current Range	:	1A, 10 Amp

Resistance Range & max resolutions: 1 micro ohm to 2000 ohm with max resolutions 0.0000001 (ohms)

Open circuit voltage	: 50 volts DC or better
Auto Demagnetization	: Should be integrated demagnetization
Resolution	: up to 4 digit
Accuracy	:+/- 0.25%
Interface	: Suitable Ethernet/USB interface
Temperature Correction	: Copper & Aluminium
Discharge	: Auto Discharge
Indication	: current Injection on and Discharge
Test Lead testing	: suitable for Power transformer
Power Supply	: 84- 264 V AC, 720VA
Humidity	: 1 to 90 % none condensing
Operating Temperature	: -10 °C to +50 °C
Storage Temperature	: -25 °C to +70 °C
Interface USB/Ethernet	: suitable interface with
Weight	: Not more than 14 kg
Safety/AMC/Vibrations	: Meets the requirements of IEC-1010-1, ISTA 1AShipping, EN61326 EMC

SD card for direct data transfer

Environmental
Operating: -20° C to 50° C (-4° F to 122° F)
Storage: -30° C to 60° C (-22° F to +140° F)
Relative humidity: 0-95% non-condensing

Case
NEMA4 ruggedized enclosure

Display
Backlit 11.5 cm x 8.5cm color VGA

Compliance
Safety/EMC/Vibration
IEC61000-4-30
IEC61000-4-15
IEC61000-4-27
IEC61010-1
CE certified

Dimensions
Less than or Equivalent 250 mm x 220 mm x 170 mm

Weight
Standard unit: 2.27 kg (5 lbs)

Voltage Channels
4 voltage channels
Voltage range: 0 to 1000 V AC / 0 – 1000 V DC
Voltage accuracy: ±0.1% per IEC61000-4-30
Crest factor: 1.5

Current Channels
4 current channels
Current range: 0 to 6000 A (CT Dependent)
Current accuracy: ±1% per IEC61000-4-30
Crest factor: 4.0

Sampling Rate
256 samples per cycle RMS. 1 MHz transient sampling rate

Software
Windows compliant (XP, Win 7, 8, 10)

Accessories:

3 units Current Clamps Split Core CT; OR
3 units Flexible (4-range) Current clamps
Voltage Leads - Range = 0 to 1000 Vac / Vdc.

Voltage leads come with a kit of multi-color clip on bands. Configure the voltage leads to match the color code configuration

Voltage Leads Fuse Adapter
Includes 4 adapters with multiple color straps.
Fuses come with a kit of multi-color clip on bands. Can be configured to match the color code of the voltage lead.

Others:
End-user-Training

8. WARRANTY:

a. The warranty period of one year will start after the testing and acceptance of NEA.
b. The Supplier warrants that the goods supplied under the Contract are new, unused, of the most recent or current models, and that they incorporate all recent improvements in design and materials, except when the technical specifications required by the Procuring Entity provide otherwise.
c. If the equipment is discovered to be defective and still under warranty, it will be replaced with new equipment.

9. OTHER REQUIREMENTS:

Suppliers

a. Suppliers must give technical training on the operation and maintenance of the provided equipment to be conducted by the Manufacturer's personnel.
b. Suppliers must be able to provide equipment calibration services.
c. Suppliers must be capable of providing after-sales service for repairs or maintenance of the equipment.

10. DELIVERY TERM:

The delivery period shall be within twenty (20) calendar days upon receipt of the approved Notice to Proceed (NTP) at the NEA Office, Quezon City.

TECHNICAL WORKING GROUP:

JULIO H. COLINA
Secretariat

ERIC B. CAMPOTO
Member

MARK LYNDON G. CORPUZ
Member

HERNANDO N. GABOTERO
Member

CYNTHIA E. LISONDRA
Member

MA. YVETTE V. MUYARGAS-PALLOGAN
Member

BONIFACIO T. DAVID
End-User

MA. CHONA O. DELA CRUZ
Co-Chairperson

Atty. BRYAN C. MERZA
Chairperson