



TERMS OF REFERENCE (TOR)

1. DESCRIPTION:

PROCUREMENT OF SUPPLY AND DELIVERY OF SUBSTATION TESTING EQUIPMENT

2. APPROVED BUDGET FOR THE CONTRACT (ABC):

The Approved Budget for the Contract (ABC) is Three Million Three Hundred Sixty Thousand Pesos (**Php 3,360,000.00**) inclusive of all taxes.

3. SOURCE OF FUND:

NEA Corporate Operating Budget FY 2024 from the Capital Outlay under Technical Equipment

4. TECHNICAL EQUIPMENT TO BE PROCURED:

- a. One (1) unit of 3-Phase Digital Transformer Turns Ratio Tester
- b. One (1) unit of 3-Phase Power Quality Analyzer
- c. One (1) unit of Transformer Ohmmeter

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 2024

6. OBJECTIVE:

In accordance with the mission statement of the Engineering Department to provide efficient technical assistance to ECs consistent with the NEA's Mission and Vision.

7. TECHNICAL SPECIFICATIONS OF THE SUBSTATION TESTING EQUIPMENT:



The NEA Engineering Department requires all bid offers to be compliant with the following requirements:

a. **3-Phase Digital Transformer Turns Ratio Tester**

Description:

The Three Phase Digital Transformer Turns Ratio (TTR) Tester is an important tool for determining the mechanical condition of transformers. All ratio tests are performed in one instrument, with only one 3Ø lead-set connection.

The TTR has a color touch display, as well as an optional printer so results are never lost. This is complimented with the ability to download results to a USB memory device.

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Testing Performed:

- a. Ratio - 3Ø Step-up testing for power transformers
- b. Phase shift and phase deviation
- c. Polarity
- d. Magnetic balance/flux distribution
- e. Excitation current characteristics
- f. Auto vector detection/recognition

Features:

- a. Step-up ratio testing
- b. Step-down ratio testing
- c. Confirmation of expected nameplate vector configuration
- d. Ability to measure actual vs expected phase shift
- e. Unique kelvin clamps with adjustable 3-inch jaw
- f. Banana plug input for connection to terminal blocks
- g. Turns ratio % error vs nameplate with pass/fail

Specifications:

Input Power

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

Output

Voltage: 3Ø, 1 - 48VAC, up to 125V on Primary

Frequency: 50-480Hz

Current: 0.1mA - 1A, Max 2A @ 48V

Turns Ratio Measurement Methods

1Ø Step Up

1Ø Step Down

**Turns Ratio Range and Accuracy - Guaranteed accuracy
from -20°C to +50°C**

Step Down Excitation

25-48V

±0.10% 0.8 - 1000

±0.20% 1001 - 2000

±0.60% 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

±0.10% 0.8 - 200 (most Power Tx)

1-24V

±0.10% 0.8 - 200

5 digit resolution

Excitation Current Measurement

Resolution: 0.1mA 0.1mA - 100mA

1mA 101-2000mA

Accuracy: ± 1% ±0.1 mA

Frequency Measurement

Resolution: 0.1 Hz

Accuracy: ±0.1% ±0.1 Hz

Transformer Phase Measurement

Range: 0 - 360 Degrees

Accuracy: ± 0.05 Degrees

Weight

6.5kg

Dimensions

406 x 304 x 254mm (16 x 12 x 8in)

Environmental

Operating -20°C to +50°C (-4°F to +122°F)

Storage -30°C to +70°C (-22°F to +158°F)

Relative Humidity 0-90%, non-condensing

Ingress Protection

TTRU3: IP 51

TTRU3 in transit case: IP 67

Regulatory

Safety

IEC 61010-1:2010 + AMD1:2016

EMI/EMC

IEC 61326-1:2012

RoHS2

EN50581

Vibration/Drop/Shock

MIL-STD-810G

Touchscreen

180mm (7 in.)

800 x 480 Resolution

1100 NITS

Transformer Testing Standards

IEEE C57.152-2013

IEC 60076-1:2011

AS/NZS 6076 1:2014

CIGRE 445 2011

Case

Ruggedized case with fold out feet

Canvas carrying bag for leads and accessories

Internal/External Data Storage

Up to 2000 sets of 3 phase results internal storage

Transferable via USB 2.0/3.0 thumb drive (32 GB)

Communication/Control Software

180mm (7in) built in display running custom GUI

Printer Output

51mm (2in) thermal printer

Prints all measurement data displayed on GUI

Accessories:

AC Adapters & Power cord – 2.5meters

3 Phase Universal Shielded Test Lead Sets

USB Cable 2m (6.6ft)

OLTC Tap Changer Cable – 9m (30ft)

Cable bag – backpack

Thumb drive (32 GB)
Triple function pen
Calibration Certificate

b. **3-Phase Power Quality Analyzer**

Description

The Power Quality Analyzer is an advanced handheld 3-phase analyzer that can view RMS data, waveforms, demand data, phase angles, harmonics, unbalance, flicker and more in real time. When data needs to be recorded, the record verification will automatically identify the current clamps, recognize their range and verify the unit is connected properly. It can record for extended periods. It can utilize an SD card, which makes expanding the memory as easy as installing a new SD card. The recorded data can be viewed on the VGA display or the data can be transferred to the Power Quality Analysis software via USB cable, USB stick, Ethernet or directly from the SD card.

Measured Parameters:

- a. RMS voltage / current
- b. Total harmonic distortion
- c. DC voltage
- d. Total demand distortion
- e. DC current (requires dc CT)
- f. Harmonics
- g. Phase-to-phase voltage
- h. Inter-harmonics
- i. Power parameters
- j. (KW, KVAR, KVA, DPF, TPF)
- k. Energy parameters
- l. (KWH, KVARH, KVAH)
- m. Voltage sag/dips and swells
- n. Mains signaling
- o. Phase angles
- p. Harmonic direction
- q. Current sags/dips and swells
- r. IEC flicker
- s. Transient down to 1 msec
- t. Rapid voltage change
- u. IEC unbalance
- v. Phase angle deviation
- w. Frequency
- x. ANSI unbalance
- y. Event waveform capture
- z. Timed waveform capture

Specifications:

Input Power

120/240 V, 50/60 Hz

International power adapter supports US, UK, EU and Australian Plugs

Battery

NiMH battery pack (field replaceable)

Discharge time – up to 8 hours

Recharge time – 3 hours

Data storage

External SD card (32GB max)

Communication

USB communications

Ethernet communications: network communications.

Wireless communications with off-the-shelf bridge.

USB stick (32GB) - transfer data file to USB. Transfer setup configurations to and from USB stick. Perform firmware upgrades using USB stick.

SD card (32 GB): automatically writes data to SD card; no manual transfer required. Transfer setup configurations to and from SD card. No tool needed to access the SD card.

Accessories:

Set of 5 voltage leads with alligator clips

Set of 3 fused adapters

Strap for hanging the Analyzer

Unfused voltage lead kit

32 GB SD card

USB Communications cable

USB Memory stick contains user guide, PQ PC Software and PQ PC Software user guide

Ethernet communications cable

Soft sided case

Power cord

Universal 24Vdc power adapter

Battery pack

Calibration Certificate

c. Transformer Ohmmeter

Description:

The Transformer Ohmmeter is a line-operated, field-portable instrument designed specifically to measure the dc resistance of all types of magnetic windings safely and accurately. It can test transformers and rotating machine windings and perform low-current resistance measurements on connections, contacts, and control circuits.

Specifications:

Input

120/240 V, 50/60 Hz, 720 VA

Output

User Selectable Current Ranges: up to 10 mA
up to 100 mA
up to 1 A
up to 10 A

Open-Circuit Test Voltage: up to 50 V dc

Resistance Measurement/Display

Resistance: 1 mW to 2000 W

Accuracy: $\pm 0.25\%$ reading, $\pm 0.25\%$ full scale (when current has stabilized)

Resolution: Up to 6 digits

Displays

Two 1" high, 6 character, 7-segment, LCDs

One 0.71" high, 6 character, 7-segment, LCD

Printer

Via RS-232 port

User Interface

B&W alphanumeric displays, keypad

Computer Interface (for downloading results)

Via RS-232 port

Internal Data Storage

Up to 10,000 data sets

Environmental

Operating: 14° F to 122° F (-10° C to 50° C)

Storage: 5° F to 158° F (-15° C to +70° C)

Relative Humidity: 0-90% non-condensing

Dimensions

8.5 H x 21.5 W x 13 D in (216 H x 546 W x 330 D mm)

Weight
Net 29 lb (13.1 kg)

Accessories:

V1 Potential Lead, 60ft (18m)
V2 Potential Lead, 60ft (18m)
Current Lead Set, 60ft (18m)
Jumper Lead, 30ft (9m)
Ground Lead, 15ft (4.5m)
RS232 Cable for connecting to a PC and Printer
Remote Hand Switch
AC Power Cord
Quick Start Guide
Canvas carrying bag for leadset
Ethernet Cable
Instruction Manual
Computer Software for Transformer Ohmmeter
Calibration Certificate

8. WARRANTY:

- a. The warranty period is three (3) years and shall commence after the issuance of final testing and acceptance of the NEA. A warranty security shall be provided by the supplier which shall remain valid within the warranty period.
- 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 found to be defective and still under warranty, it will be replaced with new equipment of equivalent or superior quality within 12 weeks from notification.

9. OTHER REQUIREMENTS:

Suppliers

- a. Suppliers must provide 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 free equipment calibration services within the warranty period.
- c. Suppliers must assign a focal person within Metro Manila to provide after-sales service for equipment repairs or maintenance within and beyond the warranty period.

10. DELIVERY PERIOD:

The delivery period shall be twelve (12) weeks from the issuance of the Notice to Proceed (NTP).

The delivery period shall be twelve (12) weeks, including days falling on Saturdays, Sundays, and holidays, from the issuance of the Notice to Proceed (NTP).

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