



**TERMS OF REFERENCE**  
**SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING**  
**OF ONE (1) UNIT 340 KVA THREE-PHASE GENERATOR SET FOR THE**  
**WIND TUNNEL OF MACTAN COMPLEX PAGASA STATION**

I. GENERAL BACKGROUND

The purchase of the three phase generator sets will be of great importance to the operation of the wind tunnels, which serve as standard to calibrate wind instruments and equipment, and the uniformity of measurement for wind speed in the Visayas PAGASA Regional Services Division (VPRSD).

This is necessary in order to have an immediate and future alternative electrical source for the wind tunnels when the required three phase power source is not readily available. In addition, these will be used now and then during the calibrations of the said wind instruments, or other calibration equipment which ensures the generator sets will not to be subjected to overwork.

Its necessity is so great that the wind instruments in its regional services will be of good quality standard for wind speed measurements for each of the anemometers at the field stations not only for PAGASA but for other government and private agencies or individuals. The results obtained can be of tremendous help to forecasters particularly to climatology, or meteorological data gatherings and in the fulfillment of the PAGASA mandate, mission and vision.

II. PROJECT DESCRIPTION

This project description covers the general technical and associated requirements for the supply, delivery, installation, testing and commissioning of one (1) unit of 340 kVA Standby Capacity, Brand New Weather Proof Silent Type Diesel Generator Set at the MACTAN COMPLEX PAGASA STATION complete with power cables, instrumentations, overload protective device, other accessories and tools necessary to meet the safe and reliable operation of the generator set.

The contractor shall accept full responsibility for its work in the design, performance qualifications, specifications, documentation, reports, fabrication, corrosion protection, cleaning, shop testing, preparation for shipment, field testing and commissioning, warranty provisions and compliance with the applicable international codes and standards and the requirements of this specifications.

*"tracking the sky... helping the country"*

Workmanship shall be of first class quality in accordance with the best modern engineering practice for the manufacture, assembly and test of all equipment and materials, notwithstanding any omissions from the specifications and drawings. To have quality workmanship, **the contractor shall be ISO 9001:2008 certified and** only technicians skilled in their respective trades shall be employed.

### III. PROJECT LOCATIONS

The Diesel Engine Generator Set including associated electrical equipment and devices shall be delivered, installed tested and commissioned at the MACTAN COMPLEX PAGASA STATION

### IV. PROJECT DURATION

The work duration or delivery period of the project is Sixty (60) calendar days reckoned from the date stated in the Purchase Order.

### V. TECHNICAL SPECIFICATIONS

#### a. Generator Specification Minimum Requirements

##### a.a Alternator;

Output Rating (kVA)	: 344KVA (Prime)
	: 375Kva (Standby)
Phase	: 3-phase (4-Wires)
Rated Voltage	: 200V-240V
Frequency	: 60Hz
Power Factor	: 0.8 (lagging)
Voltage Regulation	: within +/- 1.5%
Excitation	: Brushless rotating exciter w/ Automatic Voltage Regulator (AVR)
Insulation	: Class H

##### a.b Engine;

Type	: Vertical inline; water cooled; 4 stroke; direct injected; turbo-intercooled
Output Rating	: 313kW/1800rpm
No. of Cylinders-Bore X Stroke	: 6 – 140 X 152
Piston Displacement	: 14L
Fuel	: ASTM No. 2 Diesel
Fuel Consumption @ 75% Load	: 61.7L/h
Lube Oil Capacity	: 38.6L
Coolant Capacity	: 60.6L

Battery Capacity : 12V-150Ah (2 pcs.)  
Fuel Tank Capacity : 400L

a.c Unit;

Dimensions : 4200mm (L) x 1400mm (W) x 1900mm (H)  
Dry Weight : 3150kgs.

a.d Sound Level;

dB @ 7m : 78dB

a.e Features;

- Manual or Automatic starting and stopping capability.
- Digital Controller.
- Direct injection diesel engine for fuel efficiency.
- Brushless rotating field generator with class H insulation.
- NEMA 3R enclosure suitable for outdoor use.
- Integral vibration isolators.
- Silent type generator.

b. Power Cables and Terminals

The contractor shall provide 12 x 28 meters'/unit terminal power cables, size 100 mm<sup>2</sup> complete with terminal lugs and grounding wire size 1 x 50 mm<sup>2</sup> bare copper 1 x 2 meters length cad-welded to grounding rod 20 mm x 3 m.

c. Maintenance Tools

The contractor shall provide the following set of tools:

Complete set of common tools needed for generator set servicing, organized in molded compartment fitted for each tool, composed of the following:

- 1/4" Square drive sockets, sizes 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13 mm
- 1/4" Square drive impact sockets, sizes 8, 9, 10 and 12 mm.
- 1/4" Square drive ratchet, spinner handle, 3' extension bar, 1/4" H coupler, universal joint,
- 1/4" Square drive hex bit sockets sizes, 3, 4, 5, 6, 7 and 8mm.
- 1/4" Square drive flat bit socket sizes 4, 5.5 and 6.5 mm.
- 1/4" Square drive Phillips bit socket sizes #1, #2 and #3.
- 1/4" Square drive Pozidriv bit socket sizes #2 and #3,
- 1/4" Square drive Torx bit sockets sizes TT10, TT15, TT20, TT25, TT27, TT30 and TT40.
- 3/8" Square drive sockets, sizes 10, 11, 12, 13, 14, 15, 16, 17, 18, and 19 mm.

- 3/8" Square drive ratchet, 3" extension bar, 6" extension bar, 16 mm and 20mm plug socket, universal joint, 3/8" female to 1/4" male adaptor, 8" sliding handle,
- 1/2" Square drive sockets, sizes 20, 21, 22, 24, 27, and 32 mm.
- 1/2" Square drive impact sockets, sizes 17,19, 21, and 23mm.
- 1/2" Square drive ratchet, 5" extension bar, 10" extension bar, universal joint, 1/2" female to 3/8"
- Adjustable 3-claw oil filter wrench
- Test pen, hex key set, bit set,
- Combination wrenches sizes 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19 mm.
- Socket for air cylinder.

#### VI. SCOPE OF WORKS:

The supplier shall furnish high quality work, materials and equipment meeting the requirements of this specification and applicable international codes and standards.

The Supplier shall conduct actual inspection at site and make assessment on the physical of associated structures and determine/verify the extent of the scope of works required for the proper installation and reliable operation of the new generating sets and associated equipment.

The scope of work shall cover but not limited to the supply, delivery, installation, testing and commissioning of diesel generator sets and other electrical equipment and accessories, which shall consist of the following:

1. Supply, delivery, installation, testing and commissioning of one (1) unit of 340 KVA standby capacity, brand new weather proof, silent type generator sets at the MACTAN COMPLEX PAGASA STATION complete with Power Cables, Controls & Instrumentations, Overload Protective Devices and other Accessories.
2. Supply of labor and materials for the following:
  - Construction of concrete foundation to fit the new generator sets including anchor/machine bolts and epoxy grouts.
  - Delivery, positioning, of the new generator set at site.
  - Mounting and alignment of the new EGS to foundation completed with supply and installation of skid and vibration isolators.
  - Cable trench and other trench components.

- Installation and termination of power cables, grounding system and instrument wirings.
- Load bank testing at 0%, 30%, 50% and 100% load to be witnessed by PAGASA technical staff at the contractor's warehouse prior to delivery to MACTAN COMPLEX PAGASA STATION.
- Commissioning including Megger testing of wiring connections and actual load testing at site.
- Training of at least three (3) operators in the operation, maintenance and troubleshooting of the generator set.
- Supply of Three (3) sets of Operation and Maintenance Manual.

## VII. ADDITIONAL REQUIREMENTS

- The contractor shall submit a valid Distributorship Agreement with the manufacturer of the generator set.
- The contractor has completed within the last five (5) years a single contract in the supply, delivery, installation, testing and commissioning of generator sets equivalent to at least 50 % of the value of the Approved Budget Contract (ABC).
- The contractor shall be **ISO 9001:2008** Certified and shall be duly registered with The Philippine Contractors Accreditation Board (PCAB) classified at least under category A, in General Engineering, Electrical and Mechanical Works.
- The contractor shall provide upon completion of installation and commissioning a Warranty Certificate that the EGS is guaranteed free from factory defects on mechanical & electrical parts and workmanship for 12 months or 1,000 running hours whichever comes first.
- The contractor shall submit together with the bid a Ghant Chart outlining in detail the schedule of works starting from the date of award of contract up to testing and commissioning of the EGS.
- The contractor shall submit Electrical as built drawings signed by a licensed professional electrical engineer upon completion of installation and commissioning of the EGS.

- The contractor shall submit the resume of the following personnel who shall undertake the works.
  - Licensed Mechanical Engineer
  - Licensed Electrical Engineer
  - Registered Master Electrician
  - Safety Officer
  - Technicians/Helpers
  
- The contractor submits the following certification requirements from the manufacturer of the generator sets:
  - EN 12601:2001,  
Reciprocating internal combustion engine driven generating sets. Safety
  - EN 60204-1:2006,  
Safety of machinery. Electrical equipment of machines. General Requirements
  - EN 60034-1:2004  
Rotating electrical machines - Part 1: Rating and performance
  - EN ISO 12100-1:2003  
Safety of machinery. Basic concepts, general principles for design. Basic terminology, methodology
  - EN ISO 12100-2:2003  
Safety of machinery. Basic concepts, general principles for design. Technical principles
  - MIRTEC Certified (w/ certificate number MC/TH-C-269/08)  
**M**aterials **I**ndustrial **R**esearch and **T**echnology **C**enter
  - Original Engine Manufacturer Certificate:  
Authorizing Generator Set Manufacturer for the use of their brand of engine in the assembly of the generator set.

VIII. ABC: **PhP 4,196,967.51**