

## *Technical Specifications*

Item	Specification	Statement of Compliance
1.	<p><b><i>One (1) Lot Generator Set and Housing System</i></b></p> <p>Supply, Delivery, Installation, Commissioning and Preventive Maintenance of 25 kVA Enclosed - type Generator Set with Automatic Transfer Switch, Emergency Electrical Panel, including Electrical and Civil Works</p> <p><b><i>a. Supply, delivery and installation of one (1) unit 25 KVA capacity, 230 volts, 60 Hz, three (3) phase, standby duty type, enclosed type generator set with the following specifications:</i></b></p> <ul style="list-style-type: none"> <li>- Fuel type: diesel</li> <li>- Sub-base built-in fuel tank (at least 50 L) with maximum capacity for an 8-hour continuous operation at maximum load.</li> <li>- Fuel consumption: not more than 7L/hr at standby rating at full (100%) load</li> <li>- Full fuel content in the sub- base built-in fuel tank after the test run conducted as part of the acceptance and commissioning.</li> <li>- Heavy duty base frame</li> <li>- Governing type: Mechanical</li> <li>- Governor regulation class: ISO 8528 G2 or G3</li> <li>- No. of cylinders/alignment: 4 / In line</li> <li>- Cycle: 4 Stroke</li> <li>- Engine design/induction: naturally aspirated</li> <li>- Engine fuel system: Direct injection</li> <li>- Standard engine cooling system: water cooled and designed to operate in ambient conditions up to 50 Degrees Celsius</li> <li>- Engine speed: 1800 RPM</li> </ul>	

- Fuel filter type: replaceable element
- Alternator Design: Brushless, single bearing
- Alternator winding pitch code: 2/3 - 6
- Alternator insulation system: Class H
- Voltage regulation: (+/-)1.0% (no load to full load)
- Engine electrical system: 12Vdc/Negative ground
- Engine battery charger : 65 Amps
- Built-in battery charger compatible with the generator set battery.
- Battery charger should be able to operate with 230 (+/-) 10 V of input voltage.
- Alternator cooling: centrifugal water pump type
- Oil filter type for lubrication system: Spin-on , full flow
- Exhaust system silencer type – Industrial
- Anti-vibration mounts
- Radiator with fan, flexible exhaust connector, normal duty air cleaner, fuel filter, Lubricating oil filter
- Control system should have both automatic and manual operation controls
- The control module should display fault conditions, operational status and related metering data on panel LCD.
- Control system should measure and display generator's output voltage, current, oil pressure, coolant temperature, frequency, DC source voltage, etc.
- LCD should have backlight function
- All connections of controller are by secure plug and socket, for ease and convenience to connect, move, maintain and replace the device
- provide comprehensive display of engine data and alternator data
- Has an idle function/mode
- Self-diagnostics and circuit board diagnostic LED's, Message prompts identify faults and supply troubleshooting codes

	<ul style="list-style-type: none"> <li>- Distinguishes sender failures from actual faults to prevent nuisance shutdowns</li> <li>- Alarms to prompt warning or shutdown messages</li> <li>- Integrates automatic voltage regulation and engine speed governing</li> <li>- Controller guarding the electrical integrity of the alternator and power system from the effects of over current, over/under voltage, over/under frequency and overload conditions</li> <li>- Inclusion of one (1) unit cast iron rotary hand transfer pump for diesel fuel</li> <li>- Inclusion of one (1) unit external trickle charger compatible with the standby generator battery (12V), with protection for short circuit, DC over voltage, DC over current, AC under and over voltage, and battery charger failure</li> </ul> <p><b><i>b. Supply, delivery &amp; installation of one (1) unit 100A, 3 pole, 3 phase Automatic Transfer Switch (ATS) with the following specifications:</i></b></p> <ul style="list-style-type: none"> <li>- Type: Change over switch w/ electromagnetic coil</li> <li>- Input voltage: should be able to tolerate 240 V of input voltage. Inclusive of supply, delivery, and installation of a step-down transformer if necessary to ensure optimal ATS operation</li> <li>- Operating voltage: 220V with sufficient tolerance for genset compatibility</li> <li>- Rated current: 100 amperes</li> <li>- Withstand voltage: 2500V AC for 1 minute</li> <li>- Switching durability: minimum of 50,000 times (mechanical) and minimum of 250,000 times (electrical)</li> <li>- Insulation cover : Dust-proof mold type</li> <li>- Compliant with IEC 947-3</li> </ul>	
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	<p><i>c. Supply, delivery and installation of the following materials and services for electrical works:</i></p> <ul style="list-style-type: none"> <li>- One (1) assembly of emergency electrical panel with the following specifications and consistent with the provided load schedule:  <b>Enclosure:</b> NEMA 1  <b>Main:</b> 60AT, 200AF, 35KAIC, 3P, 230V, Industrial-type, Bolt-on, MCCB  <b>Branches:</b>  1x50AT, 22KAIC, 2P, 230V, Commercial-type, Bolt-on, MCCB  6x30AT, 22KAIC, 2P, 230V, Commercial-type, Bolt-on, MCCB  2x20AT, 22KAIC, 2P, 230V, Commercial-type, Bolt-on, MCCB  1x15AT, 22KAIC, 2P, 230V, Commercial-type, Bolt-on, MCCB</li> <li>- Complete wiring and installation from the generator set to Automatic Transfer Switch, from the Emergency Distribution Panel Board to the Automatic Transfer Switch, and from the Automatic Transfer Switch to the emergency main circuit breaker located at the Main Distribution Panel Board, per the provided schematic diagram</li> <li>- 65mm dia. uPVC conduit &amp; all accessories as needed with proper fittings for secure attachment and embedded in at least three inches (3") cement.</li> <li>- Three 30 square mm THHN/THWN stranded wire &amp; all accessories as needed</li> <li>- 14 square mm THHN/THWN stranded grounding wire, concrete grounding pit and copper grounding rod</li> <li>- Color-coded wires consistent throughout all three-phase wires</li> <li>- Synchronized phasing between the Main Distribution Panel and the generator set</li> </ul>	
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***d. Supply, delivery and installation of the following materials and services for civil, mechanical, and general works:***

- Mobilization and demobilization
- Generator set concrete foundation and anti-vibration rubber pad
- All fuel supplies shall be installed by or with supervision by a licensed supplier engineer in accordance with local regulations
- Hauling, transport and positioning of all equipment.
- Complete pre-construction plans to be submitted with the bid
- Complete housing as-built plans to be submitted upon project completion
- Complete technical, user/operations, and, troubleshooting manuals
- Supply of materials and labor for the construction of the generator set housing made of reinforced concrete pad, 6" thick concrete hollow block (CHB) walls with cyclone wire seclusion perimeter fence around the equipment, and roofing. This shall be installed by the project contractor, with supervision from a licensed supplier civil engineer, ensuring that the base can withstand the weight of the generator set and is also capable of dealing with liquid spillages. The structure must rest on solid ground, preferably compacted gravel. A detailed layout for the generator set housing is attached, with the general description specified below:
  - i. Clearance around the generator set: at least 0.60 m from the sides, at least 1.25 m from the top of the generator set to the ceiling line;
  - ii. Fence: CHB wall with G.A. 10 G.I. cyclone wire seclusion fence on top (2" x 2" opening) with 4" ø sch. 40 G.I. pipe post for the first three sides, and a concrete wall for the fourth side

	<ul style="list-style-type: none"> <li>iii. Foundation: 0.30 m x 0.30 m columns, 0.30 m x 0.20 m tie beams, 0.80 m x 0.80 m (F1) and 1.0 m x 1.0 m (F2) footings, and 0.30 m x 0.15 m roof beams. Depth of column footing from the natural ground line (NGL) is at least 1.0 m</li> <li>iv. Roof: 0.40 mm thick long span roofing supported by 2" x 4" x 1.5 mm thick metal c-purlins @ 0.60 m O.C. and 12 mm <math>\phi</math> plain round bar sagrod, angular bar steel trusses with 1/2" thick ficem board fascia</li> <li>v. Concrete pad: slab on fill with reinforced steel bars, with 0.40 m elevation from the NGL. With antivibration rubber pad.</li> <li>vi. With 50W industrial type LED fluorescent lighting fixture with switch, including all electrical and wiring installations.</li> <li>vii. With one outdoor type convenience outlet, including all electrical and wiring installations</li> <li>viii. Includes painting of interior and exterior concrete walls with at least three (3) coats of elastomeric paint</li> <li>ix. Includes painting of all metal with one (1) coat primer epoxy and two (2) coats epoxy top coat paint</li> </ul> <p><b><i>e. Site acceptance testing, quality assurance and commissioning conducted in accordance with the codes and standards specified as applicable to the following equipment:</i></b></p> <ul style="list-style-type: none"> <li>- Generator Set: On-site building load</li> <li>- Automatic Transfer Switch: Functional &amp; system voltage check</li> <li>- Uninterruptable Power Supply: Functional &amp; supply voltage check</li> <li>- Grounding System: Grounding resistance test</li> </ul>	
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- The system should pass acceptance testing (verification of manufacturer-supplied technical and performance specifications and conduct of test runs) conducted by the end-user, PNRI inspection team, and PNRI engineers, with the supplier representative.

***f. Quarterly Preventive Maintenance for a period of at least 1 year which includes at least the following monitoring activities, and checks on:***

- Physical checks: Run checks for unusual noise, vibration, leakage, deterioration and high surface temperature, etc.
- Lubricating system: Engine lubricating oil level, etc.
- Fuel system: Draining of water from fuel tank filter, fuel separator, and main tank if necessary, inspection of all components or fuel lines for leak, monitoring of linkage and ball joints on the fuel pump, etc.
- Cooling system: checking of coolant level, inspection of belting and tensioner, inspection of leak at water pump weep hole, inspection of venting line and bleed with engine running at idle, etc.
- Intake system: checking of air intake piping and connection for exposure and secure, etc.
- Exhaust system: inspection of exhaust manifold for gas leaks, and checking of exhaust piping and connection for crack and leaks, etc.
- Recording of engine RPM, engine water temperature, engine oil pressure, etc.
- Reporting: complete and detailed report of preventive maintenance activities conducted, all minor and major findings, recommendations, and a summary report shall be submitted at least five (5) days from date of preventive maintenance visit.

**g. Warranty, delivery, training, and after sales support**

- A manufacturer's warranty of the **generator set** for a minimum of 24 months or 1000 running hours whichever comes first, under standby application, first calculated from the date of commissioning, against factory defects and workmanship, repair services, and parts replacement;
- Warranty against workmanship defects, repair services and parts replacement of **the generator set housing** for a period of at least one (1) year from the date of project acceptance;
- Inclusive of all delivery charges, shipping costs, freight, customs tax and storage charges, and all other costs and charges related to delivery of complete equipment to the Philippine Nuclear Research Institute.
- Complete and comprehensive training on the operations, preventive maintenance, corrective maintenance (troubleshooting/repair) of the entire system for PNRI engineers and personnel shall be conducted by the supplier. Certificate of training shall be issued by the supplier.
- The contractor shall submit with the bid, a certificate from the manufacturer of the diesel generator set for the availability of spare parts and after sales support within the next ten (10) years from the bid submission
- The generator set manufacturer should have a local office which has its own warehouse and workshop that can provide aftersales support aside from the contractor.
- The contractor shall provide the local service hotline of the manufacturer of diesel generator set.



	<p><b><i>h. Other Requirements</i></b></p> <ul style="list-style-type: none"> <li>- The contractor shall submit together with the bid a Gantt chart outlining in detail the schedule of works starting from the date of award of contract up to testing and commissioning of the generator set.</li> <li>- The contractor shall submit with the bid the resume or profile of at least one (1) Registered Electrical Engineer who shall supervise the electrical works</li> <li>- The contractor shall submit electrical as-built drawings signed and sealed by a licensed Professional Electrical Engineer upon completion of installation and commissioning of the diesel generator set</li> <li>- Submit with the bid, a certification that the manufacturer has been in the business of manufacturing generator equipment for at least 10 years.</li> <li>- Submit with the bid, a certified true copy of the Certificate of Distributorship for the last three (3) years. The principal and the local distributor must have been in business partnership for at least three (3) years</li> <li>- The contractor shall submit parts catalogue, operation, troubleshooting, and maintenance manuals for engine and alternator after completion of the project</li> <li>- Site inspection is required. A site inspection certificate will be issued.</li> </ul>	
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***Company's Name:*** \_\_\_\_\_

***Duly authorized to sign Bid for and on behalf of:*** \_\_\_\_\_

***Date accomplished:*** \_\_\_\_\_