

SPECIFICATIONS FOR A 350 KW 60 Hz STANDBY POWER SYSTEM

Rev. March 4, 2011

I. SCOPE OF WORK:

This work shall consist of providing all materials, labor, supervision, tools, equipment and incidentals necessary to furnish, deliver, start, operate, load test, and examine for proper operation and installation by others a 350 KW emergency-standby diesel generator for the

The generator system shall be complete with outside weather housing and all associated equipment including, but not limited to, automatic transfer switch (ATS), starting batteries, battery rack and cables, engine control and instrument panel, under unit mounted fuel tank and anchor bolts for anchoring to concrete foundation pad by others. All equipment and materials shall comply with these specifications and the Virginia OSHA Standards.

II. GENERAL REQUIREMENTS:

It is the intent of these specifications to obtain a generator set and automatic transfer switch of good commercial design with a useable life expectancy of at least 20 years based on an average of 125 hours operating time per year. The equipment supplied shall meet the requirements of the NFPA 110, Level 1, NEC, NEMA, IEEE, and ANSI standards, where applicable, for design, elimination of radio noise (EMI), output filtering and temperature rise. Generator set must conform to EPA Tier 3 non-road emissions regulations, and ISO 8528-5, class G3 requirements for transient performance.

All equipment shall be new and in current production by a nationally recognized firm which manufactures the engine-generator set as a matched unit. Contractor shall have full responsibility for the performance of the generator set and its accessories. Where no specific kind of quality of material is given, items of good "industrial grade" quality and of a recognized standard manufacturer as approved by the Commonwealth shall be furnished.

III. MATERIAL REQUIREMENTS

The following specifications are based on a Kohler 350 REOZDD and related equipment. They are intended to define the level of performance and quality of the requested equipment and work and not to be restrictive by brand, manufacturer, method of configuring a system, and method of accomplishing required functions, unless otherwise indicated. The word "shall" indicates a mandatory requirement or minimum level of quality required of the Bidder or Contractor. In reference to an agency or department of the Commonwealth, the word "will" indicates an obligation. **Bidders shall annotate, explain clearly and thoroughly all similarities and differences, and return these specification pages even if offering the referenced equipment.** Bidder shall provide all pertinent information documenting compliance and equivalence with dimensions, functions, performance and quality. Documentation must be provided of all features and specifications of generator set to be provided. The Commonwealth reserves the right to obtain information, to request clarification, and to set a time limit for response. **Failure on the part of the Bidder to provide the aforementioned documentation will be cause to reject the bid as non-responsive.** All figures are approximate unless stated otherwise. The offered equipment shall provide the following or approved equal:

2. The engine shall be rated at 1800 rpm. It shall be turbocharged and after cooled as required to develop a minimum of 1.5 horse-power per rated kilowatt of generator set and have an approximate displacement of 12L to 15L (736 cubic inches to 950+cubic inches). Engine shall have a high temperature insulating jacket cover that is easily removable and fully covers exhaust manifold and all required portions of turbocharger, if equipped. The engine shall be of the overall level of quality as Detroit Diesel S60, Cummins NTA855, Caterpillar C15, or approved equivalent.

3. The engine shall be equipped with a fuel system suitable for operation on No. 2 Diesel fuel. Fuel system shall include easily replaceable primary and secondary fuel filters and lift pump. Engine fuel consumption is approximately 25 to 28 gph at full rated load and 14 to 15 gph at 50% load. Vendor must provide fuel consumption data.

4. The engine cooling system shall be designed to provide adequate cooling at full rated load in ambient temperatures of at least 100°F (38°F). The system shall include a unit mounted radiator, blower fan, water pump, and thermostat. Total engine cooling system capacity shall be a minimum of 18 gallons.

5. The engine shall be equipped with an electronic governing system to provide isochronous frequency regulation from 0 to 100% rated load and $\pm 1.0\%$ steady state regulation, maximum variation.

6. The engine shall have a full pressure lubrication system, an easily replaceable "spin on" cartridge oil filter, and a water-cooled oil cooler. Total engine oil lubrication system capacity shall be 8 gallons minimum.

7. Starting shall be by means of a solenoid operated positive engagement gear driven electric starter for operation of 12 or 24 volts D.C, negative ground system.

8. Engine protective shutdown devices shall include: 1. over cranking protection; 2. low oil pressure; 3. low coolant level; 4. high coolant temperature; and 5. overspeed.

up to one minute. If the engine has not started within the time, the control shall lock off and not resume cranking until manually reset. Individual alarm indicating lights shall be provided to show the unit shutdown due to: 1. low oil pressure, 2. low coolant level, 3. coolant high temperature, 4. over speed, 5. over crank. A five-minute unloaded running time cool down delay shall be included either in the engine starting controls or in the automatic transfer switch.

- 3. An engine and generator information display shall be installed on the unit. Display may be digital or analog, and to include the following functions, but not limited to:
 - a. AC Voltmeter
 - b. AC Ammeter
 - c. Frequency meter, 45-65 Hz., 0.5% Accuracy
 - d. Voltage adjusting rheostat ($\pm 5\%$ range)
 - e. Oil pressure, 2% Accuracy.
 - f. Coolant Temperature, 2% Accuracy
 - g. Running time meter, digital, 2% Accuracy
 - h. Battery charging ammeter or voltmeter, 2%

Accuracy

- i. Panel lights.
 - j. AC Voltmeter and Ammeter phase selector
- Provide complete detailed information on functions and features of control system offered.

- 4. The instrument and control panels(s) shall be isolated from engine vibration.

F: Automatic Transfer Switch:

- 1. An automatic transfer switch with electronic control shall be furnished. It shall meet NEMA standard ICS10-1993 "Alternating Current Automatic Transfer Switches". It shall be of microprocessor control design and rated at 1200 Ampere, 600 VAC Class, 60 Hz., 3 poles, 4 wire. It shall be mechanically and electrically inter-locked, electrically operated by power from both normal and emergency positions. It shall be listed by Underwriters Laboratories under UL Std. 1008 for emergency systems, and meet current NEMA standard ICS10 – AC Automatic Transfer Switches. It shall be rated for continuous duty and all classes of load. It shall be furnished in an outdoor, weatherproof, NEMA 3R cabinet. It shall be furnished with three phase logic boards for

Requisition number. The Certified test report shall verify the current (Amperage) and wattage output, voltage and frequency regulation, at the following minimum specified loads and operating time:

- a. No load, maximum voltage test, 30 minutes
- b. 25% load, 30 minutes
- c. 50% load, 30 minutes
- d. 75% load, 30 minutes
- e. 100% load, 30 minutes
- f. 110% load, 10 minutes

2. The generator shall be tested at the above loads through the use of pure resistive load banks at 1.0 pf. The test shall be performed at the manufacturer's or supplier's facility and shall prove that the generator set is free of any defects and shall perform to all specifications.

3. Transient responses, including voltage dips, frequency dips and recovery time period, shall be measured and agree with the data submitted with the bid. Also, the generator set shall be full load tested by the Contractor in the field at start-up prior to acceptance. Any deficiencies shall be permanently corrected by the Contractor at the sole cost of the Contractor.

IV. INSTALLATION: Unit will be installed by other parties.

V. DELIVERY:

- A. The Contractor shall plan and coordinate the delivery of the equipment with the Agency's Representative, _____, so as to cause minimal disturbance to facilities. The Contractor shall notify the Agency's Representative at least 3 working days prior to delivery.
- B. Contractor shall deliver generator set to Agency and unload in the storage area as directed. If unit is to be stored outside, Contractor shall provide, install and properly secure a suitable waterproof, UV resistant tarpaulin to protect engine, generator and fuel tank from the effects of the weather. Lightweight tarpaulins will not be accepted.
- C. Important - If engine-generator set, fuel tank and automatic transfer switch cannot be delivered to Agency for storage by _____, Contractor shall provide in writing, to the Agency's Business Manager, _____, manufacturers certification of the serial numbers for the: 1. Engine, 2. Generator, 3. Automatic Transfer Switch and 4. Fuel Tank.
- D. Contractor shall furnish and install the engine manufacturer's recommended engine lubricants and fill the cooling system with a 50% solution of automotive type ethylene glycol

antifreeze and shall be supplemented with corrosion protection inhibitors. An acceptable corrosion protection inhibitor for conventional coolants is six pints of BTE by Baldwin Filters of Kearney, Nebraska or equivalent. If extended life coolant is installed in the generator system, do not install BTE in the coolant.

VI. Inspection of Installation Work by others and Start-Up by Contractor:

1. After installation (by others), Contractor shall inspect that all aspects of the installation is made in accordance to the generator-set manufacturers recommendations, this specification, good trade practices, Virginia OSHA requirements and unit is suitable to start, test and operate.
2. The initial startup of the engine-generator set and operation of automatic transfer switch under load shall be performed by a factory trained or certified representative of the engine-generator set manufacturer. This person may also be the Contractor. The Agency Buildings and Grounds Superintendent, Farm Manager, Dairy Manager and Electrician will be present.
3. Factory representative or certified Contractor shall instruct the Agency personnel in the proper operating and maintenance procedures for all components of the standby power system.
4. After start-up, operating, examining and load testing, the Contractor and the Agency Representative shall conduct a final inspection of the equipment to verify compliance with these specifications. Any deficiencies shall be promptly and permanently corrected. After final inspection, Manufacturer's Representative or certified Contractor shall certify that all installation work, equipment and materials supplied appears proper and the commencement of the warranty will begin.

Any damage to existing utilities, equipment or finished surfaces resulting from this work shall be repaired to the Agency's satisfaction at the Contractor's sole expense.

At the conclusion of the work, the Contractor shall demonstrate to the Agency's Representative that the equipment and installation work is fully operational and in compliance with these Specifications and Codes. Any supplied equipment deficiencies shall be promptly and permanently corrected by the Contractor at the Contractor's sole expense prior to final acceptance of the work.

V. Product Documentation and Information: Bidder shall state the following for each model and item:

1. Bid price for all equipment & materials only (do not include installation)
\$ _____.
2. Rated capacity at:
 120/240 VAC, 3 Phase, 0.8 pf, _____ AMPS, _____ KW, _____ KVA
 120/208 VAC, 3 Phase, 0.8 pf, _____ AMPS, _____ KW, _____ KVA
 139/240 VAC, 3 Phase, 0.8 pf, _____ AMPS, _____ KW, _____ KVA

-
13. Two factory authorized, independent, diesel engine, repair parts sources (full names, addresses, telephone numbers.)
-

14. Type of battery used for cranking, include full information and shall include SAE type number, cold cranking capacity @ 0°F. and reserve capacity @ 80°F., etc.
-
-
-

15. Generator is capable of sustaining, without damage, at least ____% of full rated output for _____ seconds under any phase-to-phase to neutral short circuit. Include proof with bid.

16. Upon an instantaneous one-step application of any purely resistive load up to _____% of the rated KW capacity of the generator, the instantaneous voltage dip shall not exceed _____% and shall recover to + or - _____% of rated voltage within _____ seconds. Include proof with bid.

17. Additional Standards for Service

- A. Generator shall be designed and constructed so that, after warranty, should major repairs or rewind become necessary, all work may be successfully accomplished by an electric apparatus repair facility, independently of generator set manufacturer and supplier, that repairs to the Standards of the Electrical Apparatus Service Association (EASA).
- B. Diesel engine repair parts shall be readily available from a factory authorized diesel engine dealer, independently of generator set manufacturer and supplier, such as Detroit Diesel, Caterpillar, White-Hercules, John Deere or Cummings.
- C. Important: Bidder shall submit, with bid, as shown on the product information pages, a listing of two (2) independent electric apparatus repair facilities and factory authorized engine part dealers that are within 100 miles of the jobsite. The award of any resulting contract may be based on complete and verifiable information furnished with bid.
- D. Instruction, Maintenance and Repair Manuals:

The Contractor shall submit three copies to Construction and Engineering Department, COR, and one copy each to the Superintendent of Buildings and Grounds and Power Plant, loose-leaf bound instruction manuals with copy of all warranties, parts lists, lubrication instructions, electrical schematic diagrams and applicable data which will

provide guidance and reference material on the operation, adjustment, maintenance and repair of the various pieces of equipment. All instructions shall be bound together in 3-ring hard back binder with information indexed. Contractor shall also furnish manufacturer's recommended spare parts list. This shall include the manufacturer's estimate or experience based on mean time before failure (MTBF) for each item listed.