

SECTION 16620

PROPANE FUELED GENERATOR AND TRANSFER SWITCH SPECIFICATIONS

PART 1 - GENERAL

1.01 SUMMARY: This specification covers the requirements for furnishing one (1) complete and operable emergency/standby spark-ignited 30 kW propane fueled engine-generator and automatic transfer switch with all appurtenances. Equipment shall be new; factory tested, and delivered ready for installation.

1.02 SUBMITTAL:

- A. Submit the following (3 copies minimum) to the DISTRICT.
1. Specification and data sheets
 2. Manufacturer's certification of prototype testing
 3. Manufacturer's published warranty documents
 4. Shop drawings showing plan and elevation views with certified overall and interconnection point dimensions
 5. Interconnection wiring diagrams showing all external connections required; with field wiring terminals marked in a consistent point-to-point manner
 6. Generator Service Manual, Parts Manual, O&M Manual, and Installation Manual. One of each manual shall ship with the engine-generator.

1.03 SUPPLIERS:

- A. The supplier shall be the manufacturer's authorized distributor, who shall provide initial start-up services, conduct field acceptance testing, and warranty service. The supplier shall have 24-hour service availability and factory-trained service technicians authorized to do warranty service on all warrantable products.

1.04 WARRANTY:

- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than five years from the date of Substantial Completion. If the MANUFACTURER'S standard warranty is less than the stipulated period, the MANUFACTURER shall provide a special MANUFACTURER'S extended warranty for the stipulated period, or a Maintenance Bond in the form attached herein, to extend the MANUFACTURER'S warranty period for the stipulated period.
- B. The CONTRACTOR shall warranty the WORK against defects for one year from the date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS: Engine-Generator manufacturer: Generac, no substitute.

2.02 RATINGS AND OPERATING CONDITIONS:

- A. Generator set ratings: 30 kW, 38 kVA, Standby rating
- B. System voltage of: 277/480V, 3 phase
- C. Site conditions: Altitude 100 FT (30 MTR), Temperatures up to 120 degrees F (49 degrees C)

2.03 PERFORMANCE:

- A. Voltage regulatory shall be +/- 2.0 percent for any constant load between no load and rated load.
- B. Frequency regulation shall be 5.0 percent maximum under varying loads from no load to 100 percent rated load.
- C. The engine-generator set shall be capable of single step load pick up of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.
- D. The generator set shall be capable of sustaining a minimum of 90% of rated no load voltage with the specified KVA load at near zero power factor applied to the generator set.
- E. The generator shall be extended stack capable of full single-phase output at its rated kilowatts.

2.04 AC GENERATOR:

- A. The AC generator shall be: brushless synchronous type, 4 pole, revolving field, drip proof construction, single prelubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc(s).
- B. All insulation system components shall meet NEMA MG1 standard temperature limits for Class H insulation system. Actual temperature rise measured by resistance method at full load shall not exceed 125 degrees Centigrade.
- C. The generator shall be broad range, 12 lead reconnectable. The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage within the broad range.

2.05 ENGINE-GENERATOR SET CONTROL:

- A. The control shall have automatic remote start capability from a panel-mounted 3-position (Stop, Run, Remote) switch.

- B. Provide cycle cranking of 15 SEC (ON)/15 SEC (OFF) for three attempts (75 SEC). If engine fails to start, lockout the engine and indicate overcrank on alarm status panel.
- C. Provide control panel with the following:
 - 1. Provide operator interface display panel and pushbuttons for viewing engine and alternator data and providing setup, controls, adjustments, and emergency stop options.
 - 2. Provide optional analog AC meter display.
 - 3. Provide optional engine lube oil temperature data readout with “high oil temperature warning”.
- D. The NEMA 12 enclosed control/monitor panel shall be mounted on the generator set with vibration isolators.
- E. The control/monitor panel shall be powered from the engine-generator starting batteries. The control shall include surge suppression for protection of solid state components. Operation of shut down circuits shall be independent of indication and prealarm circuits. A common alarm contact for external connection to an audible alarm shall be provided.

2.06 ENGINE:

- A. The engine shall be 1800 rpm, stationary, liquid-cooled, propane fueled.
- B. The engine shall be cooled by a unit-mounted closed loop radiator system rated for full load operation in 122 degree F (50 degrees C) ambient as measured at the generator air inlet. Radiators shall be provided with a duct adapter flange permitting the attachment of an air duct directing the discharge of radiator air.
- C. The cooling system shall be filled with 50/50 ethylene glycol/water mixture by the equipment supplier. Rotating parts shall be guarded against accidental contact.

2.07 ENGINE ACCESSORY EQUIPMENT:

- A. The engine-generator set shall include the engine accessories as follows:
- B. An electric starter capable of three complete cranking cycles without overheating, before overcrank shutdown (75 seconds).
- C. Skid mounted batteries used for starting the engine along with battery cables and connectors. Batteries shall be lead acid sized as recommended by the engine manufacturer. Battery charger shall be provided with the transfer switch.
- D. Engine mounted, thermostatically controlled, water jacket heater. The heater(s) shall be sized as recommended by the equipment supplier. Heater voltage shall be 120 volt.

- E. Vibration isolators, pad isolators type, quantity as recommended by the generator set manufacturer.
- F. Provide an engine starter charging alternator, with solid state voltage regulator.
- G. Provide a complete exhaust system including a critical-grade silencer, stainless steel flexible pipe for the exhaust connection, and required mounting hardware. All piping inside the building shall be insulated.
- H. Provide a secondary fuel regulator, shut off solenoid, and vacuum safety switch for mounting on the Districts LP gas fuel line.
- I. Provide a radiator duct adapter used to attach the radiator duct to discharge air duct shroud.

2.08 BASE:

The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with battery hold down clamps within the rails. Provisions for stub up of electrical conduits shall be within the footprint of the set. Vibration isolators, standard quantity and type of the manufacturer, shall be integral between generator set and base.

2.09 ENCLOSURE:

Sound Attenuated Weatherproof Enclosure: Provide a factory installed weatherproof enclosure (Level 1 sound attenuation) sized to house the engine-generator set, exhaust silencer, batteries and charger. The enclosure shall be constructed of aluminum, with stainless steel hardware. Enclosure shall be painted to match the building exterior. Enclosure doors shall be padlockable and conveniently placed for ease of operation and maintenance.

2.10 GENERATOR SET AUXILIARY EQUIPMENT AND ACCESSORIES:

- A. Generator main circuit breaker, set mounted and wired, UL listed, molded case thermal-magnetic type, 3 pole, ratings: 480/277 volts, 60 ampere trip.
- B. Provide a thermostatically controlled heater to help alleviate buildup of condensation on the alternator windings. The heater(s) shall be sized as recommended by the equipment supplier. Heater voltage shall be 120 volt.

2.11 TRANSFER SWITCH EQUIPMENT:

- A. Provide automatic transfer switches for the specified engine-generator with optional control features.
- B. The transfer switch shall have 3 poles with a current rating of 100 amperes. System voltage rated at 480/277 VAC, 3 phase, 4 wire, 60 cycle.
- C. Transfer switches shall be mounted in a U.L. type 12 enclosure.

- D. Transfer switch equipment shall have a withstand and closing rating (WCR) of 42,000 RMS symmetrical amperes minimum, at 480 Volts.

2.12 TRANSFER SWITCH AUTOMATIC CONTROLS:

- A. Solid-state sensors shall simultaneously monitor all phases of the normal source and all phases of the emergency source.
 - 1. Controls shall start the engine-generator upon signal from normal source voltage sensors. Solid-state time delay start, adjustable from 0 to 15 seconds shall avoid nuisance start-ups on momentary voltage dips.
 - 2. Controls shall delay transfer of the load to the emergency power system after the generator reaches proper voltage and frequency to stabilize the engine-generator before application of load. Solid-state time delay shall be adjustable from 0 to 120 seconds (factory set at 2 seconds).
 - 3. Controls shall delay retransfer of the load to the normal source after normal power is restored. Solid-state time delay retransfer shall be adjustable from 0 to 30 minutes (factory set at 15 minutes).
 - 4. Controls shall delay stopping the engine-generator after retransfer to the normal source. This feature permits the engine to run unloaded to cool down before stopping. Also availability of the emergency source is maintained in the event the normal source fails shortly after retransfer. Solid-state time delay stop shall be adjustable from 0 to 30 minutes (factory set at 5 minutes).
 - 5. Controls shall cause the transfer switch to pause in the neutral position during transfer and retransfer for an adjustable delay period of 0 to 60 seconds. (programmed transition). This feature allows residual voltages from motors and transformers to decay before completing the switching cycle.
 - 6. Provide an auto/manual retransfer switch. The "auto" position automatically retransfers the load upon return of the normal power source. The "manual" position disables the automatic retransfer. Retransfer must be manually initiated unless the generator set fails.

2.13 TRANSFER SWITCH ACCESSORY ITEMS:

- A. Provide 7-day solid state exerciser clock to set the day, time, and duration of generator set exercise/test period. Provide a with/without load selector switch for the exercise period.
- B. Provide a float charge battery charger rated at 2 amperes. The battery charger will provide a charge for the engine-generator batteries located on the engine-generator skid. D.C. output voltage shall be as required. An ammeter shall display charging current. The battery charger shall have fused AC input and fused DC output.
- C. Furnish status relay outputs for Utility Connected, Generator Connected, Utility Available, and Generator Available.

PART 3 - EXECUTION

3.01 FACTORY TESTS:

- A. Generator set factory tests shall be performed at rated load and 0.8 PF. Tests shall include: run at full load, maximum power, voltage regulation, transient and steady state governing, single step load pickup, and safety shutdowns.

3.02 ON SITE ACCEPTANCE TEST:

- A. Following completion of the site work, representatives of the manufacturer shall test the generator and transfer switch for compliance with the specifications. Testing shall be scheduled and witnessed by the DISTRICT. Installation acceptance tests to be conducted on-site by the manufacturer shall include a "cold start" test, a two-hour full load test, and a one step rated load pickup test in accordance with NFPA 110. Manufacturer shall provide a resistive load bank and make temporary connections for full load test.

END OF SECTION