SECTION 263213

PACKAGED ENGINE GENERATOR SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Packaged engine generator set.

B. Radiator.

C. Exhaust silencer and fittings.

D. Fuel fittings and tank.

E. Control panel and annunciator.

F. Battery and charger.

G. Weatherproof enclosure.

1.2 RELATED SECTIONS

A. Section 26 28 26 – Enclosed Transfer Switch.

B. Section 26 41 15 - Generator Lightning Protection Systems.

1.3 REFERENCES

A. NEMA AB1 - Molded Case Circuit Breakers.

B. NEMA MG1 - Motors and Generators.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

D. NFPA 30 - Flammable and Combustible Liquids Code.

E. NFPA 37 - Stationary Combustion Engines and Gas Turbines.

F. NFPA 70 - National Electrical Code.

G. NFPA 99 - Health Care Facilities.

H. NFPA 101 - Life Safety Code.

I. NFPA 110 - Emergency and Standby Power Systems.

1.4 SUBMITTALS

A. Submit under the provisions of Division 01.

B. Shop Drawings: Indicate electrical characteristics and connection requirements. Show plan and elevation views with overall and interconnection point dimensions, fuel consumption rate, ventilation and combustion air requirements, electrical diagrams including schematic and interconnection diagrams.

C. Product Data: Provide data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, control panel, battery, battery rack, battery charger, exhaust silencer, vibration isolators, tank, and radiator.

D. Test Reports: Indicate results of performance testing.

E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

F. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

G. Manufacturer's Field Reports: Submit under the provisions of Division 01.

H. Manufacturer's Field Reports: Indicate procedures and findings.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit under the provisions of Division 01.

B. Operation Data: Include instructions for normal operation.

C. Maintenance Data: Include instructions for routine maintenance requirements, service manuals for engine and day tank, oil sampling and analysis for engine wear, and emergency maintenance procedures.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 110.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum ten (10) years documented experience, and with service facilities within 100 miles of Project.

B. Supplier: Authorized distributor of specified manufacturer with a minimum of three (3) years' documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Division 01.

B. Accept unit on site on skids. Inspect for damage.

C. Protect equipment from dirt and moisture by securely wrapping it in heavy plastic.

1.9 MAINTENANCE SERVICE

A. Furnish service and maintenance of engine generator for one (1) year from Date of Substantial Completion.

1.10 MAINTENANCE MATERIALS

A. Provide maintenance materials under the provisions of Division 01.

B. Furnish one set of tools required for preventative maintenance of the engine generator system. Package tools in adequately sized metal toolbox.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Kohler.

B. Cummins.

C. Caterpillar/Olympian.

2.2 PACKAGE ENGINE GENERATOR SYSTEM

A. Description: NFPA 110, engine generator system to provide source of power for Level 1 and 2 applications (Type 10, Class 48), and conforming to NFPA 99.

B. System Capacity: Minimum kW/kVA rating as indicated on drawings, standby rating using engine-mounted radiator.

2.3 ENGINE

A. Type: Water-cooled inline or V-type, four stroke cycle, compression ignition Diesel internal combustion engine.

B. Fuel System: Diesel.

C. Engine speed: 1800 rpm.

D. Governor: Isochronous type to maintain engine speed within 0.5 percent, steady state, and 0.5 percent, no load to full load, with recovery to steady state within 2 seconds following sudden load changes. Equip the governor with means for manual operation and adjustment.

E. Safety Devices: Engine shutdown on high water temperature, low oil pressure, overspeed, and engine overcrank. Limits as selected by manufacturer.

F. Engine Starting: DC starting system with positive engagement, number and voltage of starter motors in accordance with manufacturer's instructions. Include remote starting control circuit, with MANUAL-OFF-REMOTE selector switch on engine-generator control panel.

G. Engine Jacket Heater: Thermal circulation type water heater with integral thermostatic control, sized to maintain engine jacket water at 90 degrees F, and suitable for operation on 120 volts AC. The engine heater shall disengage during engine running.

H. Radiator: Radiator using 50/50 glycol coolant, with blower type fan, sized to maintain safe engine temperature in ambient temperature of 110 degrees F. Radiator air flow restriction 0.5 inches of water maximum.

I. Engine Accessories: Fuel filter, lube oil filter with dipstick level indicator, intake air filter, lube oil cooler, fuel transfer pump, fuel priming pump, gear-driven water pump and fuel oil cooler as required by the manufacturer. Include fuel pressure gauge, water temperature gauge, and lube oil pressure gauge on engine/generator control panel.

J. Mounting: Provide unit with suitable spring-type vibration isolators or as required by the manufacturer and mount on structural steel base.

2.4 GENERATOR

A. Generator: NEMA MG1, three phase, four pole, reconnectible brushless synchronous generator with brushless exciter.

B. Rating: Minimum kW/kVA rating as specified on drawings, at 0.8 power factor, 480Y/277 volts, 60 Hz at 1800 rpm.

C. Insulation Class: F.

D. Temperature Rise: 130 degrees C Standby.

E. Enclosure: NEMA MG1, open drip proof.

F. Voltage Regulation: Include generator-mounted volts per hertz exciter-regulator to match engine and generator characteristics, with voltage regulation plus or minus 1 percent from no load to full load. Include manual controls to adjust voltage drop, voltage level (plus or minus 5 percent) and voltage gain.

G. A permanent magnet generator (PMG) or current boost system shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controller shall be capable of sustaining and regulating current supplied to a single or three-phase fault at approximately 300% rated current for not more than 10 seconds.

2.5 ACCESSORIES

A. Sub-base Fuel Tank: UL listed, dual wall steel tank, with fill and vent, sized to operate for 72 hours at full load. Include flexible fuel line connections, fuel gauge, check valve, high and low fuel level alarm contact, leak detector and indicating light. Must be UL142 listed, double wall, and pressure tested to 3 psi. Conform to NFPA 30.

B. Exhaust Silencer: Critical grade type silencer, with muffler companion flanges and flexible stainless steel exhaust fitting, sized in accordance with engine manufacturer's instructions.

C. Batteries: Heavy duty, diesel starting type lead-acid storage batteries, 170 ampere-hours minimum capacity or as required per manufacturer. Match battery voltage to starting system. Include necessary cables and clamps.

D. Battery Tray: Treated for electrolyte resistance, constructed to contain spillage and containing battery heater to meet NFPA 110 requirements. Heater must disengage during engine running.

E. Battery Charger: Current limiting type designed to float at 2.17 volts per cell and equalize at 2.33 volts per cell. Include overload protection, full wave rectifier, DC voltmeter and ammeter, and 120 volts AC fused input. Provide wall-mounted enclosure to meet NEMA 250, Type 1 requirements. The minimum ampere capacity is to be 10 amps.

F. Line Circuit Breaker: NEMA AB 1, molded case circuit breaker on generator output with integral thermal and instantaneous magnetic trip in each pole, sized in accordance with NFPA 70. Include battery-voltage operated shunt trip, connected to open circuit breaker on engine failure. Unit mount in enclosure to meet NEMA 250, Type 1 requirements.

G. Engine-Generator Control Panel: NEMA 250, Type 1-unit mounted control panel enclosure with engine and generator controls and indicators. Include provision for padlock and the following equipment and features:
   1. Frequency Meter: 45-65 Hz. range, 3.5-inch dial.
   2. AC Output Voltmeter: 3.5-inch dial, 2 percent accuracy, with phase selector switch.

3. AC Output Ammeter: 3.5-inch dial, 2 percent accuracy, with phase selector switch.
4. Output voltage adjustment.
5. Push-to-test indicator lamps, one each for low oil pressure, high water temperature, overspeed, and overcrank.
6. Engine start/stop selector switch.
7. Engine running time meter.
8. Oil pressure gauge.
9. Water temperature gauge.
10. Auxiliary Relay: 3PDT, operates when engine runs, with contact terminals prewired to terminal strip.
11. Additional visual indicators and alarms as required by NFPA 110.
12. Remote Alarm Contacts: Pre-wire SPDT contacts to terminal strip for remote alarm functions required by NFPA 110.
13. Main leak detector.
14. Sub-base detector.

H. Remote Annunciator Panel: Flush mounted panel with painted finish, black color. Provide alarm horn, and indicators and alarms as follows:
1. High battery voltage (alarm).
2. Low battery voltage (alarm).
3. System ready.
4. Anticipatory-high water temperature.
5. Anticipatory-low oil pressure.
6. Low coolant temperature.
7. Switch in off position (alarm).
8. Overcrank (alarm).
9. Emergency stop (alarm).
10. High water temperature (alarm).
11. Overspeed (alarm).
12. Low oil pressure (alarm).
13. Line power available.
14. Generator power available.
15. Lamp test and horn silence switch.
16. Main tank leak detector (alarm).
17. Sub-base detector.
18. Sub-base tank low level alarm.

I. Weather-protective Enclosure: Reinforced steel housing allowing access to control panel and service points, with lockable and hinged doors and panels. Include fixed louvers, fuel tank, battery rack, and silencer. Manufacturer to mount on generator base.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with the manufacturer's instructions.

B. Register fuel tank in accordance with regulatory agency.

C. All work done by the contractor shall be installed so that it is weatherproof both inside and outside the generator housing.

D. Provide fuel for testing and fill tank at substantial completion.

3.2 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under the provisions of Division 01.

B. Provide full load test utilizing portable test bank, if required, for four hours minimum. Simulated power failure including operation of transfer switch, automatic starting cycle, and automatic shutdown and return to normal.

C. Record in 20-minute intervals during four-hour test:
1. Kilowatts.
2. Amperes.
3. Voltage.
4. Coolant temperature.
5. Room temperature.
6. Frequency.
7. Oil pressure.

D. Test alarm and shutdown circuits by simulating conditions.

3.3 MANUFACTURER'S FIELD SERVICES

A. Prepare and start systems under the provisions of Division 01.

3.4 ADJUSTING

A. Adjust work under the provisions of Division 01.

B. Adjust generator output voltage and engine speed.

3.5 CLEANING

A. Clean work under the provisions of Division 01.

B. Clean engine and generator surfaces. Replace oil and fuel filters.

3.6 DEMONSTRATION

A. Provide systems demonstration and documentation as required under the provisions of Division 01 as required by regulatory agency.

B. Describe loads connected to emergency system and restrictions for future load additions.

C. Simulate power outage by interrupting normal source and demonstrate that system operates to provide emergency power.

END OF SECTION