SECTION 26 32 13

ENGINE GENERATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Packaged engine generator set.

B. Exhaust silencer, emissions controls, and fittings.

C. Remote control panel.

D. Battery and charger.

E. Sound enclosure.

1.02 RELATED REQUIREMENTS

A. Section 26 36 00 - Transfer Switches: Automatic transfer switch.

1.03 REFERENCE STANDARDS

A. NECA/EGSA 404 - Recommended Practice for Installing Generator Sets; National Electrical Contractors Association.

B. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association.

D. NFPA 30 - Flammable and Combustible Liquids Code; National Fire Protection Association.

E. NFPA 70 - National Electrical Code; National Fire Protection Association.

F. NFPA 99 - Standard for Health Care Facilities; National Fire Protection Association.

G. NFPA 110 - Standard for Emergency and Standby Power Systems; National Fire Protection Association.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

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

B. 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, day tank, and remote radiator.

C. Test Reports: Indicate results of performance testing.

D. 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.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

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

G. Operation Data: Include instructions for normal operation.

H. 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.

I. Maintenance Materials and Tools: Furnish the following for Red Clay Consolidated School District's use in maintenance of project.
   1. Extra Filter Elements: One of each type, including fuel, oil and air.
   2. Tools: One set of tools required for preventative maintenance of the engine generator system. Package tools in adequately sized metal tool box.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.
   1. Maintain one copy of each document on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience with service facilities within 100 miles of Project.

C. Supplier Qualifications: Authorized distributor of specified manufacturer with minimum three years documented experience.

D. Products: Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Caterpillar Inc: www.caterpillar.com.

B. Kohler Power Systems: www.kohler.com.

C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PACKAGED ENGINE GENERATOR SYSTEM

A. Description: NFPA 110, engine generator system to provide source of power for Level 1 applications conforming to NFPA 99.

B. System Capacity: 50 kW, 63 kVA at elevation of 100 feet above sea level, continuous rating using engine-mounted radiator.

2.03 ENGINE

A. Type: Water-cooled inline or V-type, four stroke cycle, electric ignition natural-gas internal combustion engine.

B. Rating: Sufficient to operate under 10 percent overload for one hour in an ambient of 90 degrees F at elevation of 1000 feet.

C. Fuel System: Natural gas. Include manufacturer's approved regulator for pressure reduction from supply pressure.

D. Engine speed: 1800 rpm.

E. Governor: Isochronous type to maintain engine speed within 0.5 percent, steady state, and 5 percent, no load to full load, with recovery to steady state within 2 seconds following sudden load changes. Equip governor with means for manual operation and adjustment.

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

G. 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.

H. 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.

I. Radiator: Radiator using 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.

J. Engine Accessories: Fuel filter, lube oil filter, intake air filter, lube oil cooler, fuel transfer pump, fuel priming pump, gear-driven water pump. Include fuel pressure gage, water temperature gage, and lube oil pressure gage on engine/generator control panel.

K. Mounting: Provide unit with suitable spring-type vibration isolators and mount on structural steel base.

2.04 GENERATOR

2.05 ACCESSORIES

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

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

C. Battery Tray: Treated for electrolyte resistance, constructed to contain spillage.

D. 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.

E. Line Circuit Breaker: Molded case circuit breaker on generator output with integral thermal and instantaneous magnetic trip in each pole, sized in accordance with NFPA 70; UL listed. 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.

F. Engine-Generator Control Panel: NEMA 250, Type 1 generator 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 gage.
9. Water temperature gage.
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.

G. Remote Annunciator Panel: Surface mounted panel with brushed stainless steel. Provide audible and visible indicators and alarms required by NFPA 110.

H. Emissions controls: Catalyst based, meeting State of Delaware Department of Natural Resourcese and Environmental Controls standards for stand-by generators.

I. Sound Enclosure:Lift based steel construction with hinged doors,.Accoustic insulation meeting UL94HF1 flammibility classification and repels moisture absorbption. Maximium sound level shall be 69 dB at 23.1 ft.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install securely, in a neat and workmanlike manner, as specified in NECA/EGSA 404.

3.02 FIELD QUALITY CONTROL

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

B. Test alarm and shutdown circuits by simulating conditions.

C. Field-verify emissions levels to meet manufacturer's documented criteria per submittals.

3.03 ADJUSTING

A. Adjust generator output voltage and engine speed.

3.04 CLEANING

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

3.05 CLOSEOUT ACTIVITIES

3.06 MAINTENANCE

A. Provide a separate maintenance contract for specified maintenance service.

B. Provide service and maintenance of engine generator for one year from Date of Substantial Completion.

END OF SECTION