SECTION 16622
PACKAGED ENGINE GENERATOR SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES:
A. Packaged engine generator system.
B. Exhaust silencer and fittings.
C. Fuel lines
D. Remote control panel.
E. Battery and charger.
F. Weatherproof enclosure – Aluminum or Stainless Steel.

1.2 REFERENCES
A. ANSI/NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
B. ANSI/NEMA MG 1 - Motors and Generators.
C. ANSI/NFPA 70 - National Electrical Code.
D. ANSI/NEMA AB 1 - Molded Case Circuit Breakers.
E. ANSI/NFPA 110 – Emergency and Stand By Power Systems.

1.3 SYSTEM DESCRIPTION
A. Engine generator system to provide source of emergency and standby power.
B. Operation: In accordance with ANSI/NFPA.

1.4 SUBMITTALS
A. Submit shop drawings and product data under provisions of Section 01300.
B. Submit shop drawings showing plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, and electrical diagrams including schematic and interconnection diagrams.
C. Submit product 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, automatic changeover and remote annunciator.
D. Submit manufacturer's installation instructions under provisions of Section 01300.

1.5 PROJECT RECORD DOCUMENTS
A. Submit record documents under provisions of Section 01700.
B. Accurately record location of engine generator and mechanical and electrical connections.

1.6 OPERATION AND MAINTENANCE DATA
A. Submit operation and maintenance data under provisions of Section 01700.
B. Include instructions for normal operation, routine maintenance requirements, service manuals for engine, and emergency maintenance procedures, and complete manufacturer’s diagnostic software package.

1.7 QUALIFICATIONS
A. Manufacturer: Company specializing in packaged engine generator system with minimum three years documented experience.
B. Supplier: Authorized franchised distributor of engine generator manufacturer with service facilities within 50 miles of project site.

1.8 Delivery, Storage, and Handling

A. Deliver products to site under provisions of Section 01600.
B. Store and protect products under provisions of Section 01600.
C. Accept packaged engine generator set and accessories on site in crates and verify damage.
D. Protect equipment from dirt and moisture by securely wrapping in heavy plastic.

1.9 WARRANTY

A. Provide manufacturer's five-year warranty under provisions of Section 01700.

1.10 MAINTENANCE SERVICE

A. Furnish service and maintenance of packaged engine generator system for one year from Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Onan
B. Kohler
C. Caterpillar
D. Katolight

2.2 ENGINE

A. Type: Water-cooled inline or V-type, four stroke cycle, compression ignition or electric ignition internal combustion engine.
B. Rating: Sufficient to operate at 10% overload for one hour at specified elevation and ambient limits.
C. Fuel System: Natural gas with propane gas (LP gas) back up. If natural gas is not available on the site, generator shall be appropriate for LP gas only.
D. Engine Speed: 1800 rpm.
E. Governor: Isochronous type to maintain engine speed within 0.5%, steady state, and 5%, 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, over speed, and engine over crank. 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°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°F. Radiator Air Flow Restriction: 0.5" of water, maximum.
J. Engine Accessories: Lube oil filter, intake air filter, lube oil cooler, auxiliary fuel pump. Include fuel pressure gage, water temperature gage, and lube oil pressure gage on engine-generator control panel.

2.3 GENERATOR

A. Generator: ANSI/NEMA MG 1; re-connectible brushless synchronous generator with brushless exciter.
B. Insulation: ANSI/NEMA MG 1, Class F.
C. Temperature Rise: 105°C continuous.
D. Enclosure: ANSI/NEMA MG 1; open drip proof.
E. Voltage Regulation: Include generator-mounted volts per Hertz exciter-regulator to match engine and

generator characteristics, with voltage regulation +/- 1% from no load to full load. Include manual controls to adjust voltage drop +/- 5% voltage level, and voltage gain.

2.4 ACCESSORIES

A. Unit shall have standard and optional accessory equipment packages including but not limited to the following equipment:

B. Exhaust Silencer: Residential type silencer, with muffler companion flanges and flexible stainless steel exhaust fitting, suitable for horizontal orientation, sized in accordance with engine manufacturer's instructions, exhaust system insulated for heat reduction.

C. Batteries: Heavy duty. Match battery voltage to starting system. Include necessary cables and clamps.

D. Battery Tray: Plastic coated metal or wooden tray treated for electrolyte resistance. Constructed to contain spillage of electrolyte.

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 ANSI/NEMA 250, Type 1 requirements.

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 ANSI/NFPA 70. Include battery-voltage operated shunt trip, connection to open circuit breaker on engine failure. Mount unit in enclosure to meet ANSI/NEMA 250, Type 1 requirements.

G. Engine-Generator Control Panel: ANSI/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, 3½" dial.
2. AC Output Voltmeter: 3½" dial, 2% accuracy, with phase selector switch.
3. AC Output Ammeter: 3½" dial, 2% accuracy, with phase selector switch.
4. Output voltage adjustment.
5. Push-to-test indicator lamps, one each for low oil pressure, high water temperature, over speed, and over crank.
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 pre-wired to terminal strip.
11. Remote Alarm Contacts: Pre-wire SPCT contacts to terminal strip for remote alarm functions required by ANSI/NFPA.

H. Weather-protective Housing for units located on the exterior: Reinforced aluminum housing (or Stainless Steel) allowing access to control panel and service points, with lockable doors and panels. Include fixed louvers, tail pipe, rain cap kit, battery rack, and silencer.

I. Remote Engine Annunciator Panel: ANSI/NFPA; to meet NFPA 110 requirements for level I generator. Shall have color painted finish.

J. Automatic changeover from natural gas to LP gas.

K. Emergency manual stop break glass station, located in nearest adjacent electrical room.

PART 3 EXECUTION

3.1 EXAMINATION

A. Coordinate pre-construction meeting with owner general contractor and others as needed prior to start of installation.

B. Verify that surfaces are ready to receive work and field dimensions are as shown on Drawings.
C. Verify that required utilities are available in proper location and ready for use.
D. Beginning of installation means installer accepts existing conditions.

3.2 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Install in accordance with ANSI/NFPA 110.

3.3 FIELD QUALITY CONTROL
A. Field inspection and testing will be performed under provisions of Section 01400.
B. Provide full load test utilizing portable test bank for four hours minimum.
1. Simulate power failure including operation of transfer switch, automatic starting cycle, and automatic shutdown, and return to normal.
2. Notify Owner at least 24 hours prior to the test.
C. During test, record the following at 20-minute intervals:
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.

3.4 MANUFACTURER'S FIELD SERVICES
A. Prepare, start, test, and adjust systems under provisions of Section 01600.

3.5 ADJUSTING
A. Adjust work to assure proper operation.
B. Adjust generator output voltage and engine speed.

3.6 CLEANING
A. Clean work under provisions of Section 01700.
B. Clean engine and generator surfaces.

3.7 DEMONSTRATION
A. Provide systems demonstration under provisions of Section 01600.
B. Describe loads connected to emergency and standby system and restrictions for future load additions.
C. Simulate power outage by interrupting normal source, and demonstrate that system operates to provide emergency power.
D. Provide a full tank of fuel at the time of final acceptance. If LP gas is back up to natural gas provide LP gas fuel for minimum of four hours of full load operation. If natural gas is not available on the site, provide LP fuel for minimum of 24 hours of full load operation. Facilities with Enhanced Hurricane Protection Areas (EHPAs) shall have LP fuel for minimum of 24 hours of full load operation.
F. Provide manufacturer’s diagnostic literature and software, and demonstrate their use.

END OF SECTION