PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Packaged engine generator system.
2. Remote radiator.
3. Exhaust silencer.
4. Fuel system and day tank.
5. Remote status/control panel.
6. Battery and charger.
7. Weatherproof enclosure.

B. Related Sections:

1. Section 15242 - Vibration Isolation
2. Section 15260 - Piping Insulation
3. Section 15410 - Plumbing Piping: Fuel System Piping
4. Section 15450 - Plumbing Equipment: Underground Storage Tanks
5. Section 15890 - Ductwork
6. Section 15910 - Ductwork Accessories
7. Section 15936 - Air Outlets and Inlets
8. Section 15952 - Controls and Instrumentation
9. Section 09900 - Painting

1.02 REFERENCES

A. Specify Underwriters Laboratories (UL) listed equipment, assemblies and materials.

B. Where appropriate, refer to current ANSI and NEMA Standards for material ratings.


D. Institute of Electrical and Electronic Engineers (IEEE)

1.03 SYSTEM DESCRIPTION

A. Interface With Other Systems:

1. It is important to note that this system, more than any other in Division 16, closely relates to Division 15 installation procedures. Close coordination with the Mechanical Design Engineer is required to assure that installation procedures are contained in the appropriate Division 15 sections for equipment furnished under Division 16 but installed under Division 15.
1.04 SUBMITTALS

A. Require submittals under the provisions of Section 16010 - Basic Electrical Requirements and 01300 - Submittals.

B. In addition, submittal shall be required to contain the following information:

1. Plan and elevation views with all dimensions shown including points of connection.
2. Fuel consumption rates, ventilation and combustion air requirements.
3. Electrical diagrams, including schematic and inter-connection.
4. Weights of system components
5. Product data for control panel, battery, battery charger, exhaust silencer, vibration isolators, day tank, remote radiator, remote annunciator, main alternator and circuit breaker enclosure.
6. Product data for Governor.

1.05 QUALIFICATIONS

A. Manufacturer:

1. Require company specializing in package engine generator systems with minimum five years experience.

B. Service Facility:

1. Require that supplier have a local service facility within 75 miles of project with factory authorized service technicians.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Packaged Generator Systems:

1. Cummings/Onan
2. Caterpillar
3. Waukeshau

2.02 EQUIPMENT

A. Engine:

1. Water cooled diesel, sized to operate at site elevation and ambient conditions.
2. Fuel:
   a. No. 2 fuel oil.
3. Governor:
a. Isochronous type to maintain engine speed within 0.5%, steady state and 5%, no load to full load, with recovery to steady state within two seconds following sudden load changes.

4. Safety Devices:
   a. Engine shutdown on high water temperature, low oil pressure, overspeed, engine overcrank, and a means of emergency shutdown.

5. Engine Starting:
   a. DC starting system with positive engagement.

6. Engine Jacket Heater:
   a. Thermal circulation type water heater with integral thermostatic control. Maintain water jacket temperature at 80°F. Coordinate operating voltage.

7. Radiator:
   a. Glycol coolant type remote or engine mounted. Sized to maintain safe engine temperature in ambient of 110°F. For engine mounted radiator, duct flow restriction limited to .5” column of water. Provide lockable cap.

8. Engine Accessories:
   a. Fuel filter, lube oil filter, intake air filter, lube oil cooler, fuel transfer pump, fuel priming pump, gear driven water pump. Provide lockable fuel cap.

9. Mounting:
   a. Provide unit with suitable spring-type vibration isolators. Mount on structural steel base with concrete housekeeping pad.

B. Generator:

1. Generator:
   a. Three phase, six pole reconnectible brushless synchronous generator with brushless exciter.

2. Rating:
   a. Specify required kW, kVA at .8 power factor, voltage, phase, 60 Hz at rpm of motor.

3. Insulation:
   a. Class F.

4. Temperature Rise:
   a. 125°C (standby)

5. Enclosure:
   a. Open drip proof.

6. Voltage Regulation:
   a. Generator mounted volts per Hz exciter-regulator to match engine and generator characteristics, with voltage regulation plus or minus 1% form no load to full load. Include manual controls to adjust voltage drop plus or minus 5% voltage level, and voltage gain.

C. Accessories:

1. Fuel Tanks:
   a. Provide a base mounted fuel tank with capacity for 24 hours of operation and with dual integral pumps and level control. Require flexible fuel line connections, fuel gage, check valve, high fuel level alarm contact and indicating light. Coordinate
pump motor voltage. Tank shall provide required fuel containment in case of primary tank rupture.
b. Provide a day tank only if needed for proper operation.

2. Exhaust Silencer:
a. Critical type silencer with muffler connection flanges and flexible stainless steel exhaust fillings.

3. Batteries:
a. Heavy duty diesel starting type lead acid storage batteries, 170 ampere hour minimum capacity. Provide corrosion resistant tray.

4. Battery Charger:
a. Current limiting type designed to float at 2.17V per cell and equalize at 2.33V per cell. Provide with wall mounted enclosure, DC voltmeter and ammeter.

5. Line Circuit Breaker:
a. Molded case circuit breaker on generator output with integral thermal and instantaneous magnetic trip in each pole. Quantity of breakers may be more than one under certain conditions.

6. Engine-Generator Control Panel:
a. Control panel enclosure with engine and generator controls and indicators. Include the following features:
   (1) Frequency meter
   (2) AC output voltmeter with seven position phase selector switch.
   (3) AC output ammeter with four position phase selector switch.
   (4) Output voltage adjustment.
   (5) Push-to-test indicator lamps 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, 3 PDT operates when engine runs. Wire to terminal strip.
   (11) Remote Alarm contacts for remote status panel.
   (12) Fuel gage.
   (13) High fuel level alarm and low fuel level alarm.
   (14) Utility loss of power.

7. Remote Status Panel:
a. Wall mounted with the following indicators and controls:
   (1) Push-to-test indicator lamps for low oil pressure, high water temperature, overspeed and overcrank. Provide panel mounted audible alarm.
   (2) Engine start/stop selector switch and push-to-test engine run indicator light.
   (3) Fuel gage.

8. Weather-Protective Housing:
a. When package generator unit is installed outdoors, provide reinforced steel housing allowing access to control panel and service points. Include fixed louvers, day tank (if necessary for proper operation of generator), battery rack, silencer,
jacket water heater and a battery heating pad. Provide all necessary screens (heavy metal) to prevent small rodent access (rodent-proof).

b. Paint all exterior equipment including aluminum and factory finished items with color approved by UCB staff.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide proper clearances around generator assembly per manufacturer’s recommendations.

B. Require Contractor to install per manufacturer’s requirements.

C. Contractor shall provide all fuel for testing and then, after a successful test, fill the fuel tank.

3.02 FIELD QUALITY CONTROL

A. Provide for a full factory test and on site test utilizing portable test load bank for minimum four hours. Simulate power failure including operation for transfer switch, automatic starting, automatic shut down and return to normal.

B. During test record the following at twenty minute intervals:

1. Kilowatts
2. Amperes
3. Voltage
4. Coolant temperature
5. Room temperature
6. Frequency
7. Oil pressure

C. Test alarm and shutdown circuits by simulating conditions.

D. Set generator output and engine speed.

E. Turn over to CU factory test results before shipment of generator. Test shall be as in “B” above.

F. Turn over to CU written site test results of generator. Test shall be as in “B” above.

END OF SECTION