

ADDENDUM NO. 2

TO THE PROJECT MANUAL AND DRAWINGS FOR

Oak Creek Water and Sewer Utility
Oak Creek, Wisconsin
Water Treatment Plant and Low Lift Pump Station Standby Power
Generator Equipment Purchase Package

Clark Dietz Project No. O0130014

DATED: January 19, 2011

PREPARED BY: CLARK DIETZ, INC.

Note: This Addendum is hereby declared a part of the Contract Documents for the project designated above and in case of conflict, the following Addendum shall govern. Bidders shall state in their Bid Form that this Addendum has been received and is reflected in the Bid submitted.

TO THE PROJECT MANUAL

- Item 1. Specification Section 00 11 16: Proposals must be received by no later than **10:00 a.m., January 24, 2011** instead of January 21, 2011.
- Item 2. Replace Specification Section 26 32 13 with the attached revised section indicated as "Reissued in Addendum No. 2". All changes to the document are in bold font.

END OF ADDENDUM NO. 2

This addendum consists of 1 page and 1 attachment.

SECTION 26 32 13

ENGINE GENERATORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Engine generator set.
- B. Heat exchanger and expansion tanks.
- C. Exhaust silencer and fittings.
- D. Battery and charger.
- E. Accessories.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
 - 3. NEMA ICS 10 - Industrial Control and Systems: AC Transfer Switch Equipment.
 - 4. NEMA MG 1 - Motors and Generators.
- B. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. National Fire Protection Association:
 - 1. NFPA 30 - Flammable and Combustible Liquids Code.
 - 2. NFPA 110 - Standard for Emergency and Standby Power Systems.

1.3 SYSTEM DESCRIPTION

- A. Description: Engine generator assembly and accessories to provide source of power for Level 2 applications in accordance with NFPA 110. **Generator set shall meet requirements of the latest applicable EPA Standards and be EPA 2009 New Source Performance Standard for Spark Ignited Engines compliant.**
- B. Generator Set Design: The basis for design is the Caterpillar G3516 gas generator set. Other listed manufacturer's generator set must be equivalent and meet the same equipment standards pertaining to specifications, performance, and fit in the designated space shown on the drawings with proper working space clearances as required.

- C. Upon review of the submitted bid packages the Owner has the right to reject any and all bids due to any of the following conditions not being met:
1. All requested documentation is not submitted.
 2. Transient analysis and generating sizing calculations do not meet the parameters indicated in this specification.
 3. Cooling system calculations do not meet the parameters indicated in this specification.
 4. Equipment will not properly fit in the space shown on the drawings with working space clearance around the equipment as indicated on the drawings.
- D. Capacity: Generator sets shall be sized to provide standby power for the Water Treatment Plant and the Low Lift Pump Station as follows.
1. **Water Treatment Plant – 12 MGD pumping capacity and backwash capabilities. Minimum size of 1,000 Kw, 2400Y/1328 volts, 60 Hz at 1200 or 1800 rpm for the following loads and steps:**
 - a. Step 1: 600 amp load for 500 KVA, 480Y/277 volt transformer (lighting, controls, miscellaneous pumps, process equipment, etc.).
 - b. Step 2: High Lift Pump #7 – 250 HP motor on single speed, full voltage, 2300 volt controller.
 - c. Step 3: High Lift Pump #8 – 250 HP motor on single speed, full voltage, 2300 volt controller.
 - d. Step 4: Backwash Pump – 200 HP motor on single speed, full voltage, 2300 volt controller.
 2. **Low Lift Pump Station – 24 MGD pumping capacity. Minimum size of 1,000 Kw, 480Y/277 volts, 60 Hz at 1200 or 1800 rpm for the following loads and steps:**
 - a. Step 1: 150 amp load fed from MCC-2 (lighting, controls, process equipment, etc.).
 - b. Step 2: Low Lift Pump #4 – 300 HP on 480 volt soft start controller.
 - c. Step 3: Low Lift Pump #2 – 200 HP on 480 volt VFD.
 - d. Step 4: Low Lift Pump #1 – 200 HP on 480 volt soft start controller.
 - e. Step 5: Low Lift Pump #3 – 100 HP on 480 volt soft start controller.
- E. **Generator-Set Performance**
1. **Transient Performance: Not more than 20 percent voltage and frequency variation for each step- load increase or decrease. Voltage and frequency recovers to remain within the steady-state operating band within 5 seconds. Transient analysis shall indicate values that do not exceed these limits.**
 2. **Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.**
 3. **Steady-State Frequency Stability: When system is operating at any constant load within rated load, there are no random speed variations outside the steady-state operational band and no hunting or surging of speed.**
 4. **Output Waveform: At no load, harmonic content measured line to line to neutral does not exceed 5 percent total and 3 percent for single harmonics. The telephone influence factor, determined according to NEMA MG 1, shall not exceed 50.**

1.4 SUBMITTALS

- A. Shop Drawings: Indicate electrical characteristics and connection requirements. Include 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: Submit 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, and heat exchangers.
- C. Generator Sizing Calculations: Submit generator sizing calculations and transient analysis indicating the generator set will properly start and operate the loads and steps listed in this specification.
- D. Cooling System Calculations: Submit cooling calculations indicating the heat exchangers and cooling water will properly cool the engine generator.
- E. Test Reports: Indicate results of performance testing.
- F. **Compliance Documentation: Submit documentation from manufacturer indicating that the generator set is EPA 2009 New Source Performance Standard for Spark Ignited Engines compliant. Supplier shall also provide written documentation that they are responsible for providing field calibration of unit and provide services of a third-party testing agency to field certify that the generator meets the 2009 EPA NSPS emissions regulations.**
- G. Manufacturer's Field Reports: Indicate inspections, findings, and recommendations.
- H. Operation and Maintenance Data: Submit instructions and service manuals for normal operation, routine maintenance, oil sampling and analysis for engine wear, and emergency maintenance procedures.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities within 100 miles of project.
- B. Supplier: Authorized distributor of specified manufacturer with minimum three years documented experience.

1.6 WARRANTY

- A. Furnish manufacturer's extended warranty as indicated in contract documents.

1.7 MAINTENANCE SERVICE

- A. Furnish service and maintenance of engine generator for one year from December 31, 2011.

1.8 MAINTENANCE MATERIALS

- A. Furnish one set of tools required for preventative maintenance of engine generator system. Package tools in adequately sized metal tool box.
- B. Furnish two of each oil and air filter element.

PART 2 PRODUCTS

2.1 SERVICE CONDITIONS

- A. **Temperature: 40 – 105 degrees F.**
- B. **Altitude: 1,000 feet.**

2.2 ENGINE

- A. Manufacturers:
 - 1. Caterpillar.
 - 2. Cummins Onan.
 - 3. Kohler.
 - 4. **Waukesha.**
- B. Product Description: Water-cooled in-line or V-type, four-stroke cycle, electric ignition internal combustion engine.
- C. **Rating: Sufficient to operate in ambient of 105 degrees F at elevation of 1,000 feet.**
- D. Fuel System: Natural gas.
- E. **Engine speed: 1,200 or 1,800 rpm.**
- 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. Furnish 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 208 volts AC, 1 phase.
- I. Engine Accessories: Lube oil filter, intake air filter, lube oil cooler, gear-driven water pump. Furnish water temperature gage and lube oil pressure gage on engine/generator control panel.

- J. Mounting: Furnish unit with suitable spring-type vibration isolators to be mounted under structural steel frame.
- K. Coolant: Furnish 50/50 water/propylene glycol engine jacket coolant as required to maintain proper operating level.

2.3 GENERATOR

- A. Manufacturers:
 - 1. Caterpillar.
 - 2. Cummins Onan.
 - 3. Kohler.
 - 4. **Waukesha.**
- B. Product Description: NEMA MG1, three phase, six pole, reconnectable brushless synchronous generator with brushless exciter.
- C. Insulation Class: F.
- D. **Temperature Rise: 130 degrees C Continuous.**
- E. Enclosure: NEMA MG1, open drip proof.
- F. Voltage Regulation: Furnish 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. Furnish manual controls to adjust voltage droop, voltage level (plus or minus 5 percent) and voltage gain.

2.4 GOVERNOR

- A. Product Description: Isochronous governor 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.

2.5 HEAT EXCHANGER

- A. Product Description: Provide (2) remote mounted heat exchangers and expansion tanks per generator, one for engine after cooler and one for engine jacket water. Type and capacity shall be as recommended by engine manufacturer. Heat exchangers shall use domestic water supply to provide cooling and be provided with leak shields. Control valves on domestic water shall be provided and installed by Others and shall modulate on a control signal from the engine manufacturer to maintain water temperature.
- B. **Heat exchanger for after cooler shall be selected using 75 degrees F cooling water not to exceed 60 gallons per minute with maximum 115 degrees F discharge.**
- C. **Heat exchanger for engine jacket cooler shall be selected using 75 degree F cooling water not to exceed 200 gallons per minute with maximum 115 degrees F discharge.**

2.6 ACCESSORIES

- A. Exhaust Silencer: Residential type silencer (19-25 dBA), with muffler companion flanges and flexible stainless steel exhaust fitting, sized in accordance with engine manufacturer's instructions.
- B. Flexible Utility Connectors: Manufacturer's standard flexible connectors, minimum of 12" in length, for all connections to genset (including coolant piping, natural gas piping, exhaust piping, crankcase fumes, drain, etc). Provide non-ASME flanges if required to make connection to generator.
- C. Batteries: Heavy duty, diesel starting type lead-acid storage batteries, 170 ampere-hours minimum capacity. Match battery voltage to starting system. Furnish cables and clamps.
- D. Battery Tray: Treated for electrolyte resistance, constructed to contain spillage.
- E. Battery Charger: Current limiting type designed to float at 2.17 volts for each cell and equalize at 2.33 volts for each cell. Furnish overload protection, full wave rectifier, DC voltmeter and ammeter, and 120 volts AC fused input. Furnish wall mounted enclosure to meet NEMA 250, Type 1 requirements.
- F. **Line Circuit Breaker (for Low Lift Pump Station generator): NEMA AB 1, molded case LSIG electronic trip, 100% rated circuit breaker on generator output. Furnish battery voltage operated shunt trip, connected to open circuit breaker on engine failure. Unit mount in enclosure to meet NEMA 250, Type 1 requirements.**

Power Termination Box (for Water Treatment Plant generator): Furnish termination box for termination of 5 KV cables. Disconnect switch and overcurrent protection shall be provided by others in automatic transfer switch downstream of the generator.

- G. Engine-Generator Control Panel: NEMA 250, Type 1 generator-mounted control panel enclosure with engine and generator controls and indicators. Control panel shall be Caterpillar EMCP II+, or other manufacturer's equivalent. Furnish provision for padlock and the following equipment and features:
 - 1. **Frequency Meter Dial or Digital Display: 45-65 Hz. range.**
 - 2. **AC Output Voltmeter Dial or Digital Display: 2 percent accuracy, with phase selector switch.**
 - 3. **AC Output Ammeter Dial or Digital Display: 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 (**non-resettable**).
 - 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 in accordance with by NFPA 110.
12. Remote Alarm Contacts: Factory wire SPDT contacts to terminal strip for remote alarm functions in accordance with NFPA 110.
13. High battery voltage (alarm).
14. Low battery voltage (alarm).
15. Anticipatory-high water temperature.
16. Anticipatory-low oil pressure.
17. Low coolant temperature.
18. Switch not in automatic position (alarm).
19. Overcrank (alarm).
20. Emergency stop (alarm).
21. High water temperature (alarm).
22. Overspeed (alarm).
23. Low oil pressure (alarm).
24. Lamp test and horn silence switch.

H. **Communications Module:** Communications module capable of 2-way communicating via Ethernet connection to provide all control, monitoring, and programming capabilities from the generator control panel to the plant SCADA network. Provide software as required that is compatible with the plant SCADA operating system. Communications Module shall be Caterpillar PL1000, or other manufacturer's equivalent.

I. **Air/Fuel Ratio Controller:** Provide air/fuel ratio controller with each engine genset, and exhaust catalyst if required, to comply with EPA 2009 New Source Performance Standard for Spark Ignited Engines. The air/fuel ratio controller shall be installed on each package and shall be calibrated by a factory certified technician.

2.7 SOURCE QUALITY CONTROL

A. **Provide factory inspection and testing of completed assembly.**

B. Make completed engine-generator assembly available for inspection at manufacturer's factory prior to packaging for shipment. Notify Engineer at least seven days before inspection is allowed.

PART 3 EXECUTION

3.1 INSTALLATION

A. Installation of equipment shall be by Others.

3.2 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NFPA 110 requirements.

B. **The generator set shall be tested at full load for one hour, using resistive load bank, prior to shipment to the job site. Test report shall be submitted to Owner prior to shipment of generator set.**

The generator set shall be tested at full load for four hours, using resistive load bank, after installation at the job site. After the load bank test the generator set shall be tested at job site by simulating a normal utility power outage with the loads brought on line as indicated in the contract documents for two hours. Owner's representative shall be present for the job site testing.

- C. Upon completion of field start-up, the generator supplier shall provide testing by a third-party testing agency to verify emissions and provide documentation to the Owner indicating that the generator is compliant with the EPA 2009 New Source Performance Standard for Spark Ignited Engines.

3.3 MANUFACTURER'S FIELD SERVICES

- A. Section 01 00 00 - Manufacturer's field services.
- B. Prepare and start up engine-generator assembly.

3.4 ADJUSTING

- A. Section 01 00 00 - Testing, adjusting, and balancing.
- B. Adjust generator output voltage and engine speed to meet specified ratings.
- C. **A factory certified technician shall calibrate the air/fuel ratio controller on each package as required.**

3.5 DEMONSTRATION AND TRAINING

- A. Section 01 00 00 – Demonstration and Instructions.
- B. Furnish 8 hours of instruction each for six persons, to be conducted at project site with manufacturer's representative.
- C. Describe loads connected to standby system and restrictions for future load additions.
- D. Simulate power outage by interrupting normal source, and demonstrate system operates to provide standby power.
- E. **Provide 8 hours of on site assistance to Owner by manufacturer's representative to assist Owner in programming of plant SCADA system for generator set remote control and monitoring capabilities.**

END OF SECTION