CITY OF ST. CHARLES
FIRE DEPARTMENT

25 kW PACKAGED ENGINE GENERATOR SYSTEM TECHNICAL SPECIFICATIONS

1. Summary

1.1. The City of St. Charles is seeking sealed bids from qualified Contractors to remove the existing Onan generator model 30.0SK-15R/209556, Chrysler H225 engine and replace with a new up-to-date generator-set and transfer switch as specified herein. Contractors are asked to provide and install a stationary outdoor Natural Gas Generator, Kohler Model 25REZG, or equal, for St. Charles Fire Station #2 located at 2900 Production Drive St. Charles, IL 60174. The new generator shall supply power to the emergency panel using only the automatic transfer switch (ATS). The Onan generator will become the property of the Bidder and the value discounted from the cost of the new equipment.

1.2. This is a **TURN-KEY** project and bid shall include all material, equipment, labor and supervision for removal of existing generator, installation and full operation of the new equipment, including any necessary concrete slab, proper mounting hardware, sound isolators and all electrical including but not limited to conduit, wiring, bonding etc. in accordance with local, state and National Electrical Codes (NEC) and manufactures recommendations.

1.3. The existing generator service is 100 Amp, 208Y/120 3 phase 4 Wire.

1.4. **NOTE: These specifications are for Kohler brand generators. Acceptable substitutes for the Kohler brand are Cummins Power, Caterpillar Inc.; ASCO, Cummins Power and Zenith transfer switches. Substitutes offered in these brands must provide the same quality of performance as the Kohler models specified in order to meet the needs of the city. Any other brands/models which may be offered as substitutes for the Kohler brand/models MUST be approved by the City.**

2. General Requirements

2.1. The generator set and transfer switch will be a commercial design and will be complete with all of the necessary accessories for complete installation as delineated in the specifications herein. The equipment supplied shall be UL listed and meet the requirements of the National Electrical Code and applicable local codes and regulations.

2.2. All equipment shall be new and of current production by a national firm that manufactures the generator sets and controls, transfer switches, and assembles the generator sets as a complete and coordinated system. There will be one-source responsibility for warranty, parts, and service through a local representative (within 100 miles of the City of St. Charles) with factory-trained service personnel.

2.3. The Packaged Engine-driven Generator System shall be the standard product furnished by a single ISO 9001 certified manufacturer who shall be responsible for the design, coordination, and testing of the complete system and who has produced this type of equipment for a period of at least 10 years and maintains a service organization available twenty-four hours a day throughout the year.

2.4. The Packaged Engine-driven Generator System shall be assembled in the United States with over 50% of the components such as the engine, generator, auxiliary equipment,

etc., manufactured in the United States by a manufacturer currently engaged in the production of such equipment.

2.5. Any and all exceptions to the published specifications shall be subject to the approval of the City of St. Charles.

3. Submittal

3.1. The submittal shall include prototype test certification and specification sheets showing all standard and optional accessories to be supplied; schematic wiring diagrams, dimension drawings, and interconnection diagrams identifying by terminal number each required interconnection between the generator set, and the transfer switch.

4. Codes and Standards

4.1. The generator set shall be listed to UL 2200 Stationary Engine Generator Assemblies.

4.2. The generator set shall conform to the requirements of the following codes and standards:

4.2.1. NFPA 110, Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1 prototype tests required by this standard shall have been performed on a complete and functional unit. Component level type tests will not substitute for this requirement.

4.2.2. NFPA 70, National Electrical Code, Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.

4.2.3. IEC8528 part 4, Control Systems for Generator Sets.

4.2.4. IEEE446 Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.

4.2.5. City of St. Charles Code Book, Title 15 – Buildings and Construction, Chapter 15.04 Building Code, Section: 15.04.045, Amendments to the 2008 National electric Code NFPA.

4.2.6. City of St. Charles Code Book, Title 17 – Zoning, Chapter 17.22 General Provisions, Section: 17:22.050, Environmental Performance standards, Paragraphs A. Noise and D. Dust and Air Pollution.

5. Quality Control

5.1. To ensure that the equipment has been designed and built to the highest reliability and quality standards, the manufacturer and/or local representative shall be responsible for three separate tests: design prototype tests, final production tests, and site tests.

5.2. Design Prototype Tests. Components of the Packaged Engine-driven Generator System shall not be subjected to prototype tests because the tests are potentially damaging. Factory test the Packaged Engine-driven Generator System using the same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

5.2.1. Tests shall comply with NFPA 110, Level 1 Energy Converters and with IEEE Standard 115-2009 – IEEE Guide for Test Procedures for Synchronous Machines.

5.3. Final Production Tests. Before shipment, each generator set shall be tested under varying loads with guards and exhaust system in place. Tests shall include:

5.3.1. Single-step load pickup

5.3.2. Safety shutdown device testing

5.3.3. Rated Power @ 1.0 PF

5.3.4. Maximum power

5.4. Commissioning. The manufacturer and/or local representative shall provide factory trained technicians to perform an installation check, startup, and building load test. The City of St. Charles shall be notified of the time and date of the site test. The tests shall include:

5.4.1. Fuel, lubricating oil, and antifreeze shall be checked for conformity to the manufacturer's recommendations, under the environmental conditions present and expected.

5.4.2. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. These shall include: block heaters, battery chargers, alternator strip heaters, remote annunciators, etc.

5.4.3. Generator set startup under test mode to check for exhaust leaks, path of exhaust gases outside the building, cooling air flow, movement during starting and stopping, vibration during operation, normal and emergency line-to-line voltage and frequency, and phase rotation.

5.4.4. Automatic start by means of a simulated power outage to test remote-automatic starting, transfer of the load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted for proper system coordination. Engine coolant temperature, oil pressure, and battery charge level along with generator set voltage, amperes, and frequency shall be monitored throughout the test.

6. Warranty and Maintenance

6.1. All products furnished shall be guaranteed against defective parts and workmanship under terms of the Manufacturer's and Dealer's warranty. But, in no event, shall it be for period of less than two (2) years (comprehensive) from the date of commissioning the system and shall include labor, parts and travel time for necessary repairs at the substation. Running hours shall not be a limiting factor for the system warranty either by the Manufacturer or the Dealer. Optional warranties shall be available upon request.

6.2. The generator set Manufacturer and its Dealer shall maintain 24-hour parts, and service through a local representative (within 100 miles of the City of St. Charles) with factory-trained service personnel.

7. Products

7.1. The Packaged Engine-driven Generator System shall provide 25kW/25.0 kVA when operating at 120/208 (3ph) volts, 60 Hz, 1.0 power factor. The generator set shall be capable of operating at an elevation of 500 feet above sea level, ambient temperature between -22°F (-30°C) to +104°F (40°C) standby rating using the engine mounted radiator.

7.2. Motor starting performance and voltage drop determinations shall be based on the complete Packaged Engine-driven Generator System.

7.3. Vibration isolators shall be provided between the engine-alternator and heavy-duty steel base.

8. Engine

8.1. The engine shall be an EPA certified, spark-ignited, natural gas fueled, water-cooled inline or v-type block, and four-cycle operation. Speed shall not exceed 1800 revolutions

per minute at normal full load operation. The engine governor shall be electronic isochronous type capable of 0.5% steady-state frequency regulation.

8.2. The engine shall be equipped with intake air cleaners, replaceable air filters, lube oil, lube-oil cooler, coolant pump, replaceable spin-on oil filters, 12VDC electric starter, 12VDC battery-charging alternator, and electronic governor.

8.3. Natural Gas fuel supply pressure, measured at the generator set fuel inlet downstream of any fuel system equipment accessories shall be within the operating range of 1.74-2.74 kPa (7.0-11.0 in. H^2O).

9. Alternator

9.1. A single-bearing, four-pole synchronous generator (with drip proof design in accordance with NEMA MG-1 and directly connected to the engine flywheel housing) shall be provided. The insulation shall be Class H per UL1446. All winding shall be impregnated in triple dip thermo-setting moisture, oil and acid resisting polyester or vacuum impregnated with a special polyester resin and heavy coat of anti-tracking varnish for additional protection against moisture or condensation. Generator excitation shall be permanent magnet or similar type suitable for operation with non-linear loads.

9.2. The automatic voltage regulator shall maintain voltage within the limits of +/- 1.0% of rated value for any load variation between no load and full load. The output voltage will drift no more than +/- 0.5% of rated value at constant temperature and no more than +/- 1.0% of rated value over an ambient temperature range of -22°F (-30°C) to +104°F (40°C).

10. Controller

10.1. The generator control panel shall be unit-mounted; NEMA-1 enclosed, and shall provide power metering, protective relaying and engine and generator control and monitoring and operator interface functions. The operator display panel shall include, RUN/OFF/AUTO mode switch, mushroom type red emergency stop pushbutton, and exercise control switch. A method shall be provided to test all indicating lights and display.

10.2. The generator control display panel shall have an alpha-numeric display with pushbutton access for viewing engine and alternator data and providing setup, controls and adjustments.

10.3. The generator control panel shall have LED lamps indicating NOT IN AUTO, common warning, common shutdown and remote start.

10.4. The generator control panel shall include safety shutoffs and individual alarm indicators for: high engine temperature, low oil pressure, low coolant temperature, emergency stop, over crank, engine over speed, and low battery voltage.

10.5. The generator controller shall be UL 508 listed and meet NFPA 99 and NEC requirements.

11. Accessories

11.1. An automatic battery charger for maintaining battery starting power shall be provided. The battery charger input shall be 120 VAC and the output shall be a minimum of 6-amps at 12VDC. Low voltage alarm and AC power failure alarm lights as well as charge state indication lamps shall be provided. The battery charger shall have short-circuit and reverse polarity protection and be UL 1236 listed.

11.2. A battery tray treated for electrolyte resistance, constructed to contain spillage and capable of holding the manufacturer's recommended batteries shall be supplied.
11.3. A block heater that is thermostatically controlled and sized to maintain manufacturers recommended engine coolant temperature to meet the start-up requirements of NFPA 99 and NFPA 110, Level-1 shall be provided.
11.4. A UL 2200 listed, NEMA AB-1, molded case circuit breaker on the generator output with integral thermal and instantaneous magnetic trip in each pole, sized in accordance with NFPA 70 shall be provided.
11.5. A flexible fuel line shall have a fitting for the engine inlet and a threaded pipe fitting for connection to the stationary piping.
11.6. The generator Pre-alarm senders shall provide signals for local and/or remote annunciation for engine conditions approaching critical/shutdown parameters required in NFPA 110.
11.7. Remote Annunciator Panel. The remote annunciator shall meet NFPA 110, Level 1 requirements and enable remote viewing of the generator status. The panel shall be connected to the generator controller via either network communication wires or via hard wired connections. Options shall be available to provide ATS source position, loaded test, and retransfer. The panel shall have the capability to be either flush- mounted or surface-mounted. The annunciator shall meet UL508 requirements.

12. Enclosure

12.1. The existing generator set is a radiator-cooled generator set installation located indoors in the Electric room equipped with an air outlet duct and with controlled air inlet louvers to provide air and cooling. (see attached photo Entrance to Elec Room.JPG)
12.2. Access to the controller and main line circuit breaker shall meet the requirements of the National Electric Code.
12.3. An engineered temperature and rust resistant exhaust system shall be provided. All piping shall be insulated. A critical level industrial silencer shall be provided to afford maximum noise attenuation. Install critical level industrial silencer and exhaust wrap systems where applicable or required to augment exhaust system sound attenuation.

13. **Automatic Load Transfer Switch (ATS)**

13.1. The transfer switch and controller shall be the products of the same manufacturer. The manufacturer of the engine-driven generator shall furnish the automatic transfer switch to maintain system compatibility and local service responsibility for the complete Packaged Engine Generator System.
13.2. The Automatic Transfer Switch (ATS) shall be 120/208V 3 phase 100 Amps 4 Wire continuous operation in ambient temperatures of -22°F (-30°C) to +104°F (40°C). Main power switch contacts shall be rated for 250 VAC minimum.
13.3. The Automatic Transfer Switch (ATS) shall conform to the requirements of ANSI.NFPA 70, National Electric Code and NEMA Standard ICS 2-447. The Automatic Transfer Switch shall be UL-1008 listed by Underwriters Laboratories and carry the UL-1008 label.
13.4. The manufacturer shall furnish schematic and wiring diagrams for the particular automatic transfer switch and a typical interconnection wiring diagram for the entire Packaged Engine Generator System.

13.5. The Automatic Transfer Switch (ATS) shall consist of a power transfer module and a microprocessor control module interconnected to provide complete automatic operation. The power transfer module shall be mechanically held and electrically operated by a single solenoid mechanism momentarily energized from the source to which the load is to be transferred. The control module shall have solid-state sensing and control logic. Interfacing relays shall be of industrial control grade.

13.6. The Automatic Transfer Switch (ATS) shall include a microprocessor based metering device that provides real time measurements of the power system.

13.7. The Automatic Transfer Switch (ATS) shall be inherently double throw and mechanically interlocked to ensure only two positions; normal or emergency.

13.8. The Automatic Transfer Switch (ATS) shall be rated for continuous duty and braced to withstand the RMS symmetrical short circuit current available at the ATS terminals.

13.9. All the elements of the Automatic Transfer Switch (ATS) must be replaceable from the front of the switch, and the power switching devices must be replaceable without removal of the connecting cables.

13.10. LED indicating lights shall be provided; one to indicate when the Automatic Transfer Switch (ATS) is connected to the normal source (green) and one to indicate when the Automatic Transfer Switch (ATS) is connected to the emergency source (red).

13.11. A method shall be provided to test all indicating lights and display on the Automatic Transfer Switch (ATS).

13.12. The Automatic Transfer Switch (ATS) shall have a NOT-IN-AUTO LED to indicate anytime the controller is inhibiting transfer from occurring.

13.13. The Automatic Transfer Switch (ATS) shall provide an internal engine exerciser. The engine exerciser shall allow the user to program different exercise routines based on a calendar mode. For each routine, the user shall be able to : enable or disable the routine, enable or disable transfer of the load during routine, set the start time, set the time of day, set the day of the week, and set the duration of the run.

13.14. The Automatic Transfer Switch shall (ATS) internal engine exerciser shall automatically adjust for daylight saving and standard times and the date shall have the capability of automatically adjusting for leap year.

13.15. At the end of the specified exercise duration the Automatic Transfer Switch (ATS) shall run the generator for the specified cool down period. It shall be possible to end the exercise event with a single button push.

14. **Deviations**

Any deviation from this specification must be clearly pointed out; otherwise, it will be considered that items offered are in strict compliance with this specification, and the contractor will be held responsible therefore. Deviations must be explained in detail on an attached sheet(s). The contractor shall not construe this paragraph as inviting deviation or implying that any deviation will be acceptable.