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SHIP City of Oak Ridge - Materials Management
 TO 100 Woodbury Lane / P.O. Box 1
 Oak Ridge, TN 37830
 (865) 425-1819 FAX (865) 482-8475
 Lyn Majeski lmajeski@oakridgetn.gov

 Ordered - 02/25/14 Freight - Default - Handling Code
 Requested - 03/20/14 Taken By -
 Delivery - Deliveries are accepted 8 a.m. TO 3 p.m.

Description / Supplier Item	UM	Unit Cost	Extension	Req. Dt
GENERATOR - EMORY VALLEY PUMP STATION PER THE ATTACHED SPECIFICATIONS	1	EA	EA	03/20/14

 Total Order

**CITY OF OAK RIDGE, TENNESSEE
SPECIFICATIONS FOR
EMORY VALLEY PUMP STATION GENERATOR
RFQ #137865**

1. Scope of Work

- 1.1. It is the intent of this specification to secure an engine-driven generator set that has been prototype tested, factory built, production-tested, and site-tested together with all accessories necessary for a complete installation per the specifications.
- 1.2. Any and all exceptions to these specifications shall be subject to the approval of the City.
- 1.3. The power system shall be furnished by a single manufacturer who shall be responsible for the design, coordination, and testing of the complete system. The entire system shall be installed as specified.
- 1.4. The equipment shall be produced by a manufacturer who has produced this type of equipment for a period of at least 10 years and who maintains a service organization available twenty-four hours a day throughout the year.
- 1.5. The equipment shall be produced by a manufacturer who is ISO 9001 certified for the design, development, production and service of their complete product line.
- 1.6. The generator supplier shall remove and properly dispose of the existing generator, including any fuel in the existing fuel tank. Supplier shall also set, level, and anchor the new generator. These services shall be provided at no additional cost to the City.

2. General Requirements

- 2.1. It is the intent of this specification to secure a generator set system that has been tested during design verification, in production, and at the final job site. The generator set will be a commercial design and will be complete with all of the necessary accessories for complete installation as shown on the plans, drawings, and specifications herein. The equipment supplied shall 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 switchgear, 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 with factory-trained servicemen.

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, the transfer switch, and the remote annunciator panel if it is included elsewhere in these specifications.

4. Codes and Standards

- 4.1. The generator set shall be listed to UL 2200 or submitted to an independent third party certification process to verify compliance as installed.
- 4.2. The generator set shall conform to the requirements of the following codes and standards:
 - 4.2.1. CSA C22.2, No. 14-M91 Industrial Control Equipment.
 - 4.2.2. EN50082-2, Electromagnetic Compatibility-Generic Immunity Requirements, Part 2: Industrial.
 - 4.2.3. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.
 - 4.2.4. IEC8528 part 4, Control Systems for Generator Sets.
 - 4.2.5. IEC Std 61000-2 and 61000-3 for susceptibility, 61000-6 radiated and conducted electromagnetic emissions.
 - 4.2.6. IEEE446 Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
 - 4.2.7. NFPA 70, National Electrical Code, Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
 - 4.2.8. NFPA 99, Essential Electrical Systems for Health Care Facilities.
 - 4.2.9. 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.

5. Destini

- 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 emergency system, such as the engine/generator set, transfer switch, and accessories, shall not be subjected to prototype tests because the tests are potentially damaging. Rather, similar design prototypes and preproduction models shall be subject to the following tests:
 - 5.2.1. Maximum power (kW).
 - 5.2.2. Maximum motor starting (kVA) at 35% instantaneous voltage dip.
 - 5.2.3. Alternator temperature rise by embedded thermocouple and/or by resistance method per NEMA MG1-32.6.
 - 5.2.4. Governor speed regulation under steady-state and transient conditions.
 - 5.2.5. Voltage regulation and generator transient response.
 - 5.2.6. Harmonic analysis, voltage waveform deviation, and telephone influence factor.
 - 5.2.7. Three-phase short circuit tests.
 - 5.2.8. Alternator cooling air flow.
 - 5.2.9. Torsional analysis to verify that the generator set is free of harmful torsional stresses.
 - 5.2.10. Endurance testing

- 5.3. **Final Production Tests** – 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 @ 0.8 PF
 - 5.3.4. Maximum power
 - 5.3.5. Upon request, a witness test, or a certified test record sent prior to shipment.
- 5.4. **Site Tests** – The manufacturer's distribution representative shall perform an installation check, startup, and building load test. The City coordinator 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. The generator set shall include a standard one year warranty to guarantee against defective material and workmanship in accordance with the manufacturer's published warranty from date of startup. Optional warranties shall be available upon request.
- 6.2. The generator set manufacturer and its distributor shall maintain a 24-hour parts and service organization. This organization shall regularly engage in maintenance contract programs to perform preventive maintenance and service on equipment similar to that specified. A service agreement shall be available and shall include system operation under simulated operating conditions; adjustment to the generator set, transfer switch, and switchgear controls as required, and certification in the owner's maintenance log of repairs made and function tests performed on all systems.

7. **Equipment**

- 7.1. The generator set shall be a Kohler model 125REOZJG with a 4R13X alternator. It shall provide 128kW/160.0 kVA when operating at 277/480 volts, 60 Hz, 8 power factor. The generator set shall be capable of a Standby 130°C rating while operating in an ambient condition of less than or equal to 77° F and a maximum elevation of 5,250 feet above sea level.

7. Equipment, continued

- 7.2. Motor starting performance and voltage dip determinations shall be based on the complete generator set. The generator set shall be capable of supplying 540 LRKVA for starting motor loads with a maximum instantaneous voltage dip of 35%, as measured by a digital RMS transient recorder in accordance with IEEE standard 115. Motor starting performance and voltage dip determination that does not account for all components affecting total voltage dip i.e. engine, alternator, voltage regulator and governor will not be acceptable. As such, the generator set shall be prototype tested to optimize and determine performance as a generator set system.
- 7.3. Vibration isolators shall be provided between the engine-alternator and heavy-duty steel base.

8. Engine

- 8.1. The 276-cubic-inch displacement engine shall deliver a minimum of 197 HP at a governed engine speed of 1800 rpm, and shall be equipped with the following:
 - 8.1.1. Electronic isochronous governor capable of 0.25% steady-state frequency regulation.
 - 8.1.2. 12-volt positive-engagement solenoid shift-starting motor.
 - 8.1.3. 65-ampere automatic battery charging alternator with a solid-state voltage regulation.
 - 8.1.4. Positive displacement, full-pressure lubrication oil pump, cartridge oil filters, dipstick, and oil drain.
 - 8.1.5. Dry-type replaceable air cleaner elements for normal applications.
 - 8.1.6. Engine-driven or electric fuel-transfer pump including fuel filter and electric solenoid fuel shutoff valve capable of lifting fuel.
- 8.2. The turbocharged, air-cooled engine shall be fueled by diesel.
- 8.3. The engine shall have a minimum of 4 cylinders and be liquid-cooled by Unit Mounted Radiator 122°F/50°C.
- 8.4. The engine shall be EPA certified from the factory.

9. Alternator

- 9.1. The alternator shall be salient-pole, brushless, 2/3-pitch, 12 lead, self-ventilated with drip-proof construction and amortisseur rotor windings and skewed for smooth voltage waveform. The ratings shall meet the NEMA standard (MG1-32.40) temperature rise limits. The insulation shall be class H per UL1446 and the varnish shall be a fungus resistant epoxy. Temperature rise of the rotor and stator shall be limited to Standby 130°C. The excitation system shall be of brushless construction controlled by a solid-state voltage regulator capable of maintaining voltage within $\pm 0.25\%$ at any constant load from 0% to 100% of rating. The AVR shall be capable of proper operation under severe nonlinear loads and provide individual adjustments for voltage range, stability and volts-per-hertz operations. The AVR shall be protected from the environment by conformal coating. The waveform harmonic distortion shall not exceed 5% total RMS measured line-to-line at full rated load. The TIF factor shall not exceed 50.
- 9.2. The alternator shall have a single maintenance-free bearing, designed for 40000 hour B10 life. The alternator shall be directly connected to the flywheel housing with a semi-flexible coupling between the rotor and the flywheel.

9. Alternator, continued

- 9.3. The generator shall be inherently capable of sustaining at least 250% of rated current for at least 10 seconds under a 3-phase symmetrical short circuit without the addition of separate current-support devices.

10. Controller

10.1. Decision-Maker® 550 Controller

- 10.1.1. The generator set controller shall meet NFPA 110 Level 1 requirements (1996 version) and shall include an integral alarm horn as required by NFPA.
- 10.1.2. The controller shall meet NFPA 99 and NEC requirements.
- 10.1.3. The controller shall be UL 508 listed.

10.2. Applicability

- 10.2.1. The controller shall be standard on a 125REOZJG.
- 10.2.2. The controller shall support 12-volt starting systems.
- 10.2.3. The controller's environmental specification shall be: -40°C to 70°C operating temperature range and 5-95% humidity, non-condensing.
- 10.2.4. The controller shall mount on the generator or remotely within 40 feet with viewable access.

10.3. Hardware Requirements

- 10.3.1. Control Panel shall include:
1. The control shall have a run-off/reset-auto three-position selector switch.
 2. A controller-mounted, latch-type emergency stop pushbutton.
 3. Five indicating lights: System Ready – green; Not in Auto – yellow; Programming Mode – yellow; System Warning – yellow; System Shutdown - red
 4. Display with two lines of 20-alphanumeric characters, viewable in all light conditions.
 5. Sixteen position snap action sealed keypad for menu selection and data entry.
 6. For ease of use, an operating guide shall be printed on the controller faceplate.
 7. An audible alarm with alarm silence capability.
 8. Panel lights shall be supplied as standard.

10.4. Control Functional Requirements

- 10.4.1. Field-programmable time delay for engine start. Adjustment range 0-5 minutes in 1 second increments.
- 10.4.2. Field-programmable time delay engine cooldown. Adjustment range 0-10 minutes in 1 second increments.
- 10.4.3. Capability to start and run at user-adjustable idle speed during warmup for a selectable time period (0-10 minutes), until engine reaches preprogrammed temperature, or as supported by ECM-equipped engine.
- 10.4.4. The idle function including engine cooldown at idle speed.
- 10.4.5. Real-time clock and calendar for time stamping of events.
- 10.4.6. Output with adjustable timer for an ether injection starting system. Adjustment range, 0-10 seconds.
- 10.4.7. Output for shedding of loads if the generator set reaches a user programmable percentage of its kW rating. Load shed shall also be enabled if the generator set output frequency falls below 59 Hz.

- 10.4.8. Programmable cyclic cranking that allows up to six crank cycles and up to 35 seconds of crank time per crank cycle.
- 10.4.9. The capability to reduce controller current battery draw, for applications where no continuous battery charging is available. The controller vacuum fluorescent display should turn off automatically after the controller is inactive for 5 minutes.
- 10.4.10. Control logic with alternator protection for overload and short circuit matched to each individual alternator and duty cycle.
- 10.4.11. Control logic with RMS digital voltage regulation. A separate voltage regulator is not acceptable. The digital voltage regulator shall be applicable to single- or three-phase systems.
- 10.4.12. The capability to exercise the generator set by programming a running time into the controller. This feature shall also be programmable through the PC software.
- 10.4.13. Control function shall include output voltage adjustment.
- 10.4.14. Battle switch function selection to override normal fault shutdowns, except emergency stop and overspeed shutdown.
- 10.4.15. The control shall detect the following conditions and display on control panel:
 - 1. Customer programmed digital auxiliary input ON (any of the 21 inputs available)
 - 2. Customer programmed analog auxiliary input out of bounds (any of 7 inputs for ECM equipped engines and 5 inputs for non ECM engines)
 - 3. Emergency stop
 - 4. High coolant temperature
 - 5. High oil temperature
 - 6. Controller internal fault
 - 7. Locked rotor - fail to rotate
 - 8. Low coolant level
 - 9. Low oil pressure
 - 10. Master switch error
 - 11. NFPA common alarm
 - 12. Overcrank
 - 13. Overspeed with user-adjustable level, range 60-70 Hz.
 - 14. Overvoltage with user adjustable level, range 105% to 135%
 - 15. Overfrequency with user adjustable level, range 102% to 140%
 - 16. Underfrequency with user adjustable level, range 80% to 90%
 - 17. Undervoltage with user adjustable level, range 70% to 95%
 - 18. Coolant temperature signal loss
 - 19. Oil pressure gauge signal loss

Conditions resulting in generator warning (generator will continue to operate):

- 1. Battery charger failure
- 2. Customer programmed digital auxiliary input on (any of the 21 inputs available)
- 3. Customer programmed analog auxiliary input on (any of the 7 inputs available on ECM engines and 5 inputs for non ECM engines)
- 4. Power system supplying load
- 5. Ground fault detected - detection by others
- 6. High battery voltage - Level shall be user adjustable.
- 7. Range 29-33 volts for 24-volt systems.
- 8. High coolant temperature
- 9. Load shed

10. Loss of AC sensing
11. Underfrequency
12. Low battery voltage - level shall be user adjustable, range 20-25 volts for 24-volt systems.
13. Low coolant temperature
14. Low fuel level or pressure
15. Low oil pressure
16. NFPA common alarms
17. Overcurrent
18. Speed sensor fault
19. Weak battery
20. Alternator protection activated

10.5. Control Monitoring Requirements

10.5.1. All monitored functions must be viewable on the control panel display.

10.5.2. The following generator set functions shall be monitored:

1. All output voltages - single phase, three phase, line to line, and line to neutral, 0.25% accuracy
2. All single phase and three phase currents, 0.25% accuracy
3. Output frequency, 0.25% accuracy
4. Power factor by phase with leading/lagging indication
5. Total instantaneous kilowatt loading and kilowatts per phase, 0.5% accuracy
6. kVARs total and per phase, 0.5% accuracy
7. kVA total and per phase, 0.5% accuracy
8. kW hours
9. A display of percent generator set duty level (actual kW loading divided by the kW rating)

10.5.3. Engine parameters listed below shall be monitored: (*available with ECM equipped engines)

1. Coolant temperature both in English and metric units
2. Oil pressure in English and metric units
3. Battery voltage
4. RPM
5. Lube oil temperature*
6. Lube oil level*
7. Crankcase pressure*
8. Coolant level*
9. Coolant pressure*
10. Fuel pressure*
11. Fuel temperature*
12. Fuel rate*
13. Fuel used during the last run*
14. Ambient temperature*

10.5.4. Operational records shall be stored in the control beginning at system startup.

1. Run time hours
2. Run time loaded hours
3. Run time unloaded hours
4. Number of starts
5. Factory test date
6. Last run data including date, duration, and whether loaded or unloaded
7. Run time kilowatt hours

- 10.5.5. The following operational records shall be a resettable for maintenance purposes:
 1. Run time hours
 2. Run time loaded hours
 3. Run time unloaded hours
 4. Run time kilowatt hours
 5. Days of operation
 6. Number of starts
 7. Start date after reset
- 10.5.6. The controller shall store the last one hundred generator set system events with date and time of the event.
- 10.5.7. For maintenance and service purposes, the controller shall store and display on demand the following information:
 1. Manufacturer's model and serial number
 2. Battery voltage
 3. Generator set kilowatt rating
 4. Rated current
 5. System voltage
 6. System frequency
 7. Number of phases
- 10.6. Inputs and Outputs
 - 10.6.1. Inputs
 1. There shall be 21 dry contact inputs that can be user-configured to shut down the generator set or provide a warning.
 2. There shall be 7 user-programmable analog inputs for ECM-equipped engines (5 for non-ECM engines) for monitoring and control.
 3. Each analog input can accept 0-5 volt analog signals
 4. Resolution shall be 1:10,000
 5. Each input shall include range settings for 2 warnings and 2 shutdowns.
 6. All values shall be on the control panel display.
 7. Shall be user-assigned.
 8. Additional standard inputs required:
 - Input for an external ground fault detector. Digital display shall show "ground fault" upon detection of a ground fault.
 - Reset of system faults.
 - Remote two-wire start.
 - Remote emergency stop.
 9. Idle mode enable.
 - 10.6.2. Outputs
 1. All NFPA 110 Level 1 outputs shall be available.
 2. Thirty outputs shall be available for interfacing to other equipment:
 - All outputs shall be user-configurable from a list of 25 functions and faults.
 - These outputs shall drive optional dry contacts.
 3. A programmable user-defined common fault output with over 40 selections shall be available.

10.7. Communications

- 10.7.1. If the generator set engine is equipped with an ECM (engine control module), the controller shall communicate with the ECM for control, monitoring, diagnosis, and meet SAE J1939 standards.
- 10.7.2. Industry standard Modbus communication shall be available.
- 10.7.3. A Modbus master shall be able to monitor and alter parameters, and start or stop a generator.
- 10.7.4. The controller shall have the capability to communicate to a personal computer (IBM or compatible) running Windows '9X or Windows NT.
- 10.7.5. Communications shall be available for serial, CAN, and Ethernet bus networks.
- 10.7.6. A variety of connections shall be available based on requirements:
 - 1. A single control connection to a PC.
 - 2. Multiple controls on an intranet network connected to a PC.
 - 3. A single control connection to a PC via phone line.
 - 4. Multiple controls to a PC via phone line.
- 10.7.7. Generator and transfer switch controls shall be equipped with communications modules capable of connecting to the same communication network.
- 10.7.8. The capability to connect up to 128 controls (any combination of generator sets and transfer switches) on a single network shall be supported.
- 10.7.9. Cabling shall not be limited to the controller location.
- 10.7.10. Network shall be self-powered.

11. **Accessories**

- 11.1. Air Restriction Indicator: The air cleaner restriction indicator shall indicate the need for maintenance of the air cleaners.
- 11.2. Battery Charger: A 10-ampere automatic float to equalize battery charger with the following features:
 - 1. 12 or 24 VDC output
 - 2. Voltage regulation of 1% from no to full load over 10% AC input line voltage variations
 - 3. Ammeter and voltmeter with 5% full-scale accuracy
 - 4. LED lamp for power indication
 - 5. Current limited during engine cranking, short circuit, and reverse polarity conditions
 - 6. Temperature compensated for ambient temperatures for -40°C to 60°C
 - 7. UL Listed
- 11.3. Battery Rack and Cables: Battery rack and battery cables capable of holding the manufacturer's recommended batteries shall be supplied.
- 11.4. Block Heater: The block heater shall be thermostatically controlled and sized to maintain manufacturer's recommended engine coolant temperature to meet the start-up requirements of NFPA 99 and NFPA 110, Level 1.
- 11.5. Critical Silencer: The engine exhaust silencer shall be temperature and rust resistant, and rated for critical applications. The silencer will reduce total engine exhaust noise by 25-35 db(A).
- 11.6. Circuit Breaker: The generator shall come with a primary, factory installed, 100% rated line circuit breaker of 200 amperes that is UL2200 listed. Line circuit breakers shall be sized for the rated ampacity of the genset. Load side lugs shall be provided from the factory.

11. Accessories, continued

- 11.7. Dry Contact Kits: The 10 Dry Contact Kit shall provide normally open and normally closed, gold-plated contacts in a form C configuration to activate warning devices and other customer-provided accessories allowing remote monitoring of the generator set. Typically, lamps, audible alarms, or other devices signal faults or status conditions.
- 11.8. Failure Relay:
 - 11.8.1. The common failure relay shall remotely signal auxiliary faults, emergency stop, high engine temperature, low oil pressure, overcrank, and overspeed via one single-pole, double-throw relay with 10 amps at 120 VAC contacts.
 - 11.8.2. The relay contacts shall be gold flashed to allow use of low current draw devices (100ma @ 28VDC min.).
 - 11.8.3. Once energized the relay shall remain latched until the system is reset by the main controller switch.
- 11.9. Flex Exhaust Tub: The exhaust piping shall be gas proof, seamless, stainless steel, flexible exhaust bellows with threaded NPT connection.
- 11.10. Flexible Fuel Lines: The two fuel lines shall have fittings for the engine inlet/return and threaded pipe fittings for connection to the subbase fuel tank (or stationary piping).
- 11.11. Rodent Guards: Generator rodent guards shall prevent intrusion and protect internal components.
- 11.12. Run Relay: The run relay shall provide a three-pole, double-throw relay with 10-amp/ 250 VAC contacts to indicate that the generator is running. The relay provides three sets of dry contacts for energizing or deenergizing customer devices while the generator is running (e.g. louvers, indicator lamps, etc.)
- 11.13. Standard Air Cleaner: The air cleaner shall provide engine air filtration which meets the engine manufacturer's specifications under typical operating conditions.

12. Double Wall Secondary Containment Sub Base Fuel Tank

- 12.1. A subbase fuel tank used in conjunction with a diesel powered generator set of 125kW will contain 298 gallons of fuel to support the generator set for a period of 24 hours at 100% of rated load and 31 hours at 75% of rated load.
- 12.2. The subbase fuel system is listed under UL 142, subsection entitled Special Purpose Tanks EFVT category, and will bear their mark of UL Approval according to their particular classification.
- 12.3. The above ground steel secondary containment rectangular tank for use as a sub base for diesel generators is manufactured and intended to be installed in accordance with the Flammable and Combustible Liquids Code—NFPA 30, the Standard for Installation and Use of Stationary Combustible Engine and Gas Turbines—NFPA 37, and Emergency and Standby Power Systems—NFPA 110.
- 12.4. Primary Tank: It will be rectangular in shape and constructed in clam shell fashion to ensure maximum structural integrity and allow the use of a full throat fillet weld.
Steel Channel Support System: Reinforced steel box channel for generator support, with a load rating of 5,000 lbs. per generator mounting hole location. Full height gussets at either end of channel and at generator mounting holes shall be utilized.

12. Double Wall Secondary Containment Sub Base Fuel Tank, continued

Exterior Finish: The exterior coating has been tested to withstand continuous salt spray testing at 100 percent exposure for 244 hours to a 5 percent salt solution at 92-97° F. The coating has been subjected to full exposure humidity testing to 100 percent humidity at 100° F for 24 hours. Tests are to be conducted in accordance with The American Standard Testing Methods Society.

- 12.5. Venting: Normal venting shall be sized in accordance with the American Petroleum Institute Standard No 2000, Venting Atmospheric and Low Pressure Storage Tanks not less than 1-1/4" (3 cm.) nominal inside diameter.
- 12.6. Emergency Venting: The emergency vent opening shall be sized to accommodate the total capacity of both normal and emergency venting and shall be not less than that derived from NFPA 30, table 2-8, and based on the wetted surface area of the tank. The wetted area of the tank shall be calculated on the basis of 100 percent of the primary tank. The vent is spring-pressure operated: opening pressure is 0.5/psig and full opening pressure is 2.5 psig. The emergency relief vent is sized to accommodate the total venting capacity of both normal and emergency vents.
- 12.7. Fuel Fill: There shall be a 2" NPT opening within the primary tank and lockable manual fill cap.
- 12.8. Fuel Level: A direct reading, UL listed, magnetic fuel level gauge with a hermetically sealed vacuum tested dial shall be provided to eliminate fogging.
- 12.9. Low Fuel Level Switch: Consists of a 30 watt float switch for remote or local annunciation of a (50% standard) low fuel level condition.

13. Weather Enclosure

- 13.1. All enclosures shall be constructed from high strength, low alloy steel, aluminum or galvanized steel.
- 13.2. The enclosure shall be finish coated with powder baked paint for superior finish, durability, and appearance. Enclosures will be finished in the manufacturer's standard color.
- 13.3. The enclosures shall allow the generator set to operate at full load in an ambient temperature of 40 - 45°C with no additional derating of the electrical output.
- 13.4. Enclosures shall be equipped with sufficient side and end doors to allow access for operation, inspection, and service of the unit and all options. Minimum requirements are two doors per side. When the generator set controller faces the rear of the generator set, an additional rear facing door is required. Access to the controller and main line circuit breaker shall meet the requirements of the National Electric Code.
- 13.5. Doors shall be hinged with stainless steel hinges and hardware and be removable.
- 13.6. Doors shall be equipped with lockable latches. Locks shall be keyed alike.
- 13.7. The enclosure roof shall be pitched to prevent accumulation of water.
- 13.8. A duct between the radiator and air outlet shall be provided to prevent re-circulation of hot air.
- 13.9. The complete exhaust system shall be internal to the enclosure or optional with external mounted silencer.
- 13.10. The critical silencer shall be insulated with a tailpipe and rain cap.