

EMERGENCY PUMP ENGINES – SECTION 470

I. GENERAL

I.1. SCOPE OF WORK

The Contractor shall furnish, install and test a complete, self-contained, automatic standby emergency pump engine system as specified herein. The self-contained emergency pump engine system shall consist of a pump and engine unit, which upon interruption of normal power from MCC or high float level, will provide the required pumping capacity for the station. Diesel engine driven pump sets shall be of the latest commercial type and design with all necessary controls. Contractor shall furnish and install fuel tank, enclosure, engine foundation and fuel tank foundation and all accessories necessary for a complete and operable installation. The enclosure shall be weatherproof, constructed with 5000 marine grade aluminum. All materials shall be new unless specifically called for otherwise. Under this purchase order number or contract number, JEA and the contractor shall be entitled to the special rates and purchase price of equipment and services. The contractor (not JEA) shall pay all cost associated with the installation of the emergency backup pump engine system.

I.2. SHOP DRAWING SUBMITTALS AND ADDITIONAL SUBMITTALS

The Contractor shall be required to submit a complete shop drawing submittal, signed and sealed by a Florida Registered Professional Engineer.

- I.2.1. Five hard copies, plus the number of copies the Contractor wishes returned as well as three electronic copies, shall be submitted to the Engineer for approval.
- I.2.2. List of five or more operating installations using major components of the same or similar type equipment furnished for this project.
- I.2.3. Name and address in Jacksonville of permanent parts supply from which parts may be obtained in sufficient quantity on a 24 hour basis.
- I.2.4. Shop drawings of the pump engine set, complete power and control wiring diagrams, foundation requirements, auxiliary equipment required including tanks, switches, controls, weatherproof enclosure, breaker, wiring and accessories shall be submitted.
- I.2.5. Manufacturer's product data describing unit, auxiliary equipment required, including switches, engine, and pump. Include the following:
 - I.2.5.1. Specifications for fuel
 - I.2.5.2. Make of engine
 - I.2.5.3. Number of cylinders
 - I.2.5.4. Compression ratio
 - I.2.5.5. Bore, inches
 - I.2.5.6. Stroke, inches
 - I.2.5.7. Piston displacement, cubic inches
 - I.2.5.8. Piston speed at rated RPM, feet per minute
 - I.2.5.9. Make and type of pump
 - I.2.5.10. Pump rating
- I.2.6. Two complete sets of operating and maintenance manuals shall be supplied for the pump/engine set and for auxiliary equipment.
- I.2.7. Manufacturer's warranty.

I.3. RATING

Pump Engine set shall be capable of producing rated output for continuous duty at rated engine pump RPM when equipped with necessary operating accessories such as air cleaners, lubricating oil pump, fuel transfer pump, radiator fan, and jacket water pump. Unit shall be sized to pump _____. Responsibility for sizing pump engine shall lie with the pump engine supplier and Engineer.

I.4. QUALITY ASSURANCE

I.4.1. Unit shall be the product of a firm regularly engaged in the manufacture of diesel engines and pumps, and a standard model in regular production at the manufacturer's place of business. Both engine and pumps shall be warranted by the same manufacturer to establish single source responsibility.

I.4.2. Only current units which can be properly maintained and serviced without the necessity of JEA carrying extensive parts stock, or being subject to long periods of interrupted service due to unavailable parts will be considered. Pump-Engine supplier shall maintain a local parts and service facility. Service facility shall have no less than 80 percent of all engine replacement parts in its stock at all times.

I.5. WARRANTY AND SERVICE CONTRACT**I.5.1. Pump – Engine Manufacturer Warranty:**

Equipment furnished under this section shall be guaranteed against defective parts and workmanship under terms of the manufacturer's and dealer's standard warranty for 5 year from date of acceptance of the system and shall include labor travel time for necessary repairs and supply of a complementary pump/engine set at the job site for duration of the repairs. Running hours shall not be a limiting factor for the system warranty.

I.5.2. Contractor Warranty:

The Contractor shall supply to JEA a two (2) year unconditional warranty after substantial project completion or project acceptance or any other design portion thereof. The warranty shall include materials and installation and shall constitute complete replacement and delivery to the site of materials and installation of same to replace defective materials or defective workmanship with new materials/workmanship conforming to the specifications.

I.5.3. The manufacturer shall provide the services of a factory-trained service representative to verify the correctness of the Contractor completed installation; to check all electronic circuitry and mechanical components to assure their proper function; to make all necessary measurements in and around the engine and pump. A minimum of 2 days startup services shall be provided. The manufacturer shall provide through the Contractor to JEA a written certification that the installation is complete, correct and properly calibrated; by written notation for the pump engine certification and the Contractor shall endorse its accuracy.

I.6. PERMITTING OF ABOVEGROUND FUEL STORAGE TANK (LARGER THAN 550 GALLONS)

I.6.1. Prior to construction of an aboveground fuel storage tank, the contractor shall obtain a copy of the approved construction permit by local regulatory agencies for the installation of the fuel tank. The contractor shall coordinate with David Norse (904) 665-5501 of JEA to assist with this effort and DEP notifications in accordance with state of Florida Guidelines.

II. DIESEL ENGINE

- II.1. The Engine set shall be as manufactured by _____, and provided under the JEA/_____ contract specifications.
- II.2. Diesel engine shall be vertical or "V" multi-cylinder, full diesel, mechanical injection, heavy-duty type with non Electronic Control Module (ECM), arranged for direct connection to a pump engine, and shall be the product of a manufacturer regularly engaged in the building of full diesel engines. Engine shall be a current model which has been in regular production for at least three years. Engine shall develop sufficient brake horsepower, net rated RPM, corrected to sea level barometric pressure (29.92 in. HG) and 110 degrees F, to operate pump continuously at its rated output with all losses included without undue heating, vibration or wear. Diesel engine shall be water cooled four cycle compression ignition diesel. The engine exhaust manifold shall have an expanded metal guard spread sufficiently away from hot parts. Engine shall meet specifications when operating on off road ultra-low sulfur diesel.
- II.3. Engine shall be equipped with a pressure lubrication system supplying oil to all surfaces requiring lubrication. Circulation shall be by a positive displacement pump. Lubrication system shall include a full flow strainer, oil filter, and an oil cooler of sufficient capacity to properly cool all lubrication oil circulated.
- II.4. Engine shall have an individual mechanical injection pump and injection valve for each cylinder. Injection pumps and injection valves shall not require adjustment in service. Fuel injection pumps shall be positive action, constant-stroke pumps, actuated by a cam driven by gears from the engine crankshaft. All injection pumps and valves shall be serviced by Engine Manufacturer certified personnel.
 - II.4.1. Fuel lines between injection pump and valves shall be heavy 316 SS seamless tubing; and, to eliminate irregularity of fuel injections, shall be of the same length for all cylinders.
 - II.4.2. Fuel system shall be equipped with replaceable fuel filter elements, which may be easily removed without breaking any fuel line connections or disturbing the fuel pumps or another part of the engine. Provide easily serviceable and replaceable fuel/water separator/filter ahead of other fuel filters.
 - II.4.3. All fuel filters shall be conveniently located in one accessible housing, ahead of injection pumps so that fuel will have been thoroughly filtered before it reaches the pumps. No screens or filters requiring cleaning or replacement shall be used in injection pump or injection valve assemblies.
 - II.4.4. Engine shall be equipped with a built-in gear-type engine-driven fuel transfer pump, capable of lifting fuel against a head of twelve feet, for supplying fuel through filters to injection pump at constant pressure.
- II.5. Engine shall be provided with suitable safety controls to automatically stop the unit when low oil pressure, water temperature or engine speed exceeds safe limits. Pilot lights shall be provided to visually indicate the cause of engine shut down. Pilot lights shall operate off battery circuit and shall be on pump-engine control panel. Provide contacts for remote engine failure annunciation.
- II.6. Engine shall be equipped with a bronze glow(dipped) coated aluminum radiator and blower fan of sufficient capacity for cooling engine when diesel set is delivering full rated speed an ambient temperature of 125 degrees F. Air flow restriction from radiator shall not exceed 0.5

inches H₂O. Engine shall have a thermostat integral with jacket water circuit to maintain water at proper operating temperature. The radiator tank can be plastic. Engine shall have a belt driven centrifugal type water pump for circulating water through cooling system.

- II.7. Provide a critical grade type exhaust silencer, manufactured of 316 stainless steel as specified in this specification.
- II.8. Engine shall be provided with an antifreeze solution of 50 percent ethylene glycol, and suitable unit mounted, thermal circulation type water heater incorporating a thermostatic switch to maintain engine jacket water at 90 degrees F. in an ambient temperature of 30 degrees F. Heater shall be 1000 watts minimum, single phase, 60 Hertz, and applicable voltage. Jacket Water Heater Hoses shall be reinforced rubber heater hose type or better with ball valves to isolate hose in the event that the hoses or JWH needs replacing.
- II.9. Furnish a set of spare parts and tools regularly supplied with engine. Include all tools of a special nature required to properly service engine.
- II.10. Provide one or more engine mounted dry type air cleaners of sufficient capacity to protect working parts of the engine from dust and grit.
- II.11. Engine shall be equipped with an oil/ vapor recovery container or box that meets EPA regulations. The intent of the recovery system is so the blow by waste will not escape into the atmosphere or soak the radiator coils, as well as be a possible housekeeping issue around the engine-generator.
- II.12. All engine exhaust emissions shall meet EPA requirements for standby power generation.
- II.13. Engine starting system shall include an electric motor start system of not less than 24 volts, including dc starting motor, required voltage battery pack and rack, cables, and battery charger.
 - II.13.1. For engine-generator, sets rated 750 kW and above, a redundant electric starting motor shall be provided.
- II.14. The batteries shall be of the lead acid type. The batteries shall be sized to provide the specified number of starts, cranking time at firing speed (five 10 second cranks) at any ambient between minimum (7 °F) and maximum (105 °F) design ambient temperatures, with final discharge voltage, exceeding minimum control power supply voltage requirements. The batteries shall have a capacity of 135 AH minimum. Batteries shall be complete with cables and rack. Battery shall be rated in accordance with requirements of engine manufacturer. Batteries shall be located for easy removal and servicing.
- II.15. Battery Charger:
 - II.15.1. Current limiting battery charger to automatically charge batteries.
 - II.15.2. Charger shall be dual charge rate with automatic switching to boost rate when required.
 - II.15.3. Charger shall be mounted at rear of engine-generator set inside the enclosure.
 - II.15.4. Control wire connection between starting and safety circuits shall be pre-connected before arriving at job site.
 - II.15.5. The service powered battery charger shall float charge the battery pack and shall be solid-state, full wave bridge rectified type, using silicon controlled rectifiers for power control. The battery charger shall be suitable for the required voltage, and current, battery pack type, shall have a dc output circuit breaker, floating voltage

equalization, equalizing timer, a ground detection system, a voltage relay to activate low battery voltage alarms at the engine-generator control panel, and battery charger failure which shall alarm at the engine-generator control panel. Charger shall be 120v single phase.

III. PUMP

- III.1. Pump shall be designed so all components are accessible with a minimum amount of labor. Both engine and pump shall be warranted and serviced by same manufacturer.
- III.2. Close Coupled centrifugal pump with vacuum priming compressor mounted to a diesel engine.
- III.3. Continuously operated air injector priming device requiring no periodic adjustment or control.
- III.4. Centrifugal pump shall be capable of handling 3" diameter non-compressible solids.
- III.5. Centrifugal pump shall be capable of fully self-priming on its own with a 25' static suction lift without the need of a foot valve or add-on priming device.
- III.6. Liquid-filled vacuum gauge for system diagnostics shall be viewable from outside enclosure.
- III.7. GR – Ready Prime Series type pump or equal.

IV. ENGINE STARTING AND CONTROL PANEL

- IV.1. Furnish and install an automatic starting mechanically controlled engine panel in the pump-engine enclosure (section V.) Starting section shall automatically start engine upon high level sensor through starting contacts in control panel. Unit shall serve to operate as follows: High level sensor contact initiates starting cycle of diesel engine. Lack of oil pressure or over-temperature of cooling system will cause second relay in cranking panel to be energized, causing starting cycle to be terminated immediately. Should engine fail to start for any reason, a time delay relay in cranking panel limits its cranking period to 30 seconds. A push-button switch mounted on cranking panel shall allow engine to be further cranked at the operator's discretion. Resumption of low level shall open engine contacts in control panel and shall cause engine to shut down after 5 minute delay.
- IV.2. Pump-engine controls will include an auto start feature controlled by one or more float balls or submersible transducer. It shall be a mechanical non mercury type float switch housed in a hermetically sealed polypropylene enclosure designed to extend into a wet well. The transducers polyurethane jacket shielded cable shall be of suitable length for proper installation into a wet well without splicing. The level control system shall continuously monitor the wet well level. Upon operator selection of automatic operation, the level controller shall start the pump- engine unit when the liquid level in the wet well rises to the pump start level. When the liquid is lowered to the pump stop level the level controller shall stop this pump – engine.
- IV.3. ENGINE CONTROLS
 - IV.3.1. Mechanically controlled engine control panel shall provide the following functions:
 - IV.3.1.1. Battery DC volts
 - IV.3.1.2. Coolant temperature
 - IV.3.1.3. Lube oil pressure
 - IV.3.1.4. Pump-Engine set operating hours
 - IV.3.1.5. With exception to mechanical control is fuel solenoid, starter and shutdown sensors.

- IV.3.2. Automatic/Manual Start-Stop with the following safety shutdowns:
The engine shall be started, stopped, and controlled by a digital controller. The controller shall be weather proof enclosed, and contain an external weatherproof keypad accessible without the need to remove or open any protective cover or enclosure. It shall be designed to start/stop the engine at a signal supplied by high and low level floats or a 4-20 mA transducer. The controller shall provide the following functions without modification, factory recalibration, or change of chips or boards, by simply accessing the keypad.
- IV.3.2.1. The keypad shall be a capacitive touch sensing system. No mechanical switches will be acceptable. The keypad shall operate in extreme temperatures, with gloves, through ice, snow, mud, grease, etc. and maintain complete weather-tight sealing of the controller.
 - IV.3.2.2. In automatic mode, the unit shall conserve energy and go to "sleep".
 - IV.3.2.3. The controller shall function interchangeably from float switches, pressure switch, or transducer, as well as manual start/stop by selection at the keypad. No other equipment or hardware changes are required.
 - IV.3.2.4. The controller with integrated Auto Throttle shall be capable of varying the engine speed to maintain a constant level or pressure in a process without a change to the controller other than via the keypad.
 - IV.3.2.5. The start function can be programmed to provide three separate functions each day for seven days (i.e. a start, warm up, exercise cycle on two separate days at different times and for a varying length of time all via the keypad).
- IV.3.3. Manual-Automatic Button:
- IV.3.3.1. In Manual Mode, manual "Start" button starts engine and runs until "Stop" button is depressed or an emergency shutdown occurs.
 - IV.3.3.2. In Automatic Mode, start/stop sequencing is initiated by either two normally-open narrow angler float switches, pressure switch, level transducer, or a signal from a digital input.
 - IV.3.3.3. The controller shall integrate the engine safety shut-off for low and high oil temperature along with coolant, and provide over-speed protection.
 - IV.3.3.4. The controller shall include standard, field-adjustable parameters for engine cycle crank timer, shutdown time delay, warm-up time delay, and cool-down time delay.
 - IV.3.3.5. The controller shall have only one circuit board with eight built-in relays. Three (3) of the relays shall be programmable to output desired parameter on display and to be used as dry-contacts for communication with JEA SCADA system, all via the keypad without changing relays, chips, printed circuits, or any hardware or software.
 - IV.3.3.6. Standard components shall consist of (24) digital inputs, (7) analog inputs, (1) magnetic pick-up input, (8) 20-amp form "C" relays, (1) RS232 port, (1) RS485 port, (1) RS232/RS485 port, (1) J1939 port, and (1) Full graphic LCD display with backlight.

- IV.3.3.7. The industrially-hardened Controller shall withstand 10ppm H₂S, Vibration of 3 g, 3 axis, frequency swept 10-1000 Hz, in an operating temperature Range of 4° to 176°F (-20° to 80°C) and an operating humidity range of 0-95% Non-Condensing.
- IV.3.3.8. Controller shall be capable of communicating all status and control via ONE of the following protocols Modbus, Profibus or Profinet.
- IV.3.3.9. Controller shall have programmable parameters to prevent surges in the system such as ramp time, high discharge pressure warning and shutdown.
- IV.3.3.10. Over-speed protection and indicator
- IV.3.3.11. Low lube oil pressure protection and indicator
- IV.3.3.12. High coolant temperature protection and indicator
- IV.3.3.13. Over-crank protection and indicator
- IV.3.3.14. Low coolant level protection
- IV.3.4. Engine Control Switch (Three-Position: Stop – Manual – Auto)
- IV.3.5. Indicator/Display, Test Switch
- IV.3.6. Control device shall be non-alternator driven speed control reframe. Control device shall be read off the magnetic pick-up.
- IV.3.7. Unit shall be capable of interfacing with JEA SCADA equipment.

V. WEATHERPROOF ENCLOSURE, NON-WALK-IN TYPE

- V.1. The complete pump-engine set shall be enclosed in a modular, non-walk-in type, marine grade aluminum weatherproof enclosure, constructed with 5000 marine grade aluminum. The enclosure shall be constructed of removable side panels and end panels. All fasteners and hardware used in construction of the enclosure shall be type 316 stainless steel. The unit shall have hinged side doors each side and hinged doors at control end, equipped with key locks for ease of engine maintenance, hold open devices and a three point latch system. Doors shall be pad lockable and a minimum of 36 inches. There shall be a stainless steel expanded metal grating or a punched louvered radiator core guard installed - flush with the enclosure panels in front for the radiator grill, and fixed, punched louvered air intake ports on the enclosure sides and rear for proper air circulation within the housing. Provide lifting eyes and spreader bar reinforcement for crane unloading. Provide ¼ inch thick "non skid" deck underneath housing. The enclosure shall be constructed as a sound attenuated style with a maximum dba rating of 85 dba at 15 feet.
- V.2. Battery charger shall be mounted at rear of engine set. Control shall incorporate equipment as previously specified. Control wire connection between starting and safety circuits shall be pre-connected before arriving at job site. Provisions shall be made for mounting batteries and rack inside the enclosure. The engine control panel, distribution (lights, battery charger jacket water heater, etc.) breaker panel, batteries and accessories shall be enclosed in the enclosure.
- V.3. All engine oil and coolant drains shall be piped to outside of enclosure with shutoff valves and shall have threaded 316 stainless steel with anti-sieze. The threaded drain lines shall be labeled on the outside of the enclosure with an aluminum label with aluminum or stainless rivets.

- V.4. Secondary Enclosure color allowed if requested by special organization or HOA is Pad-mount Green, Steel-Master 9500 30% Silicone Alkyd Enamel Ultra deep/Clear tint base supplied by Sherwin-Williams or approved equivalent.
- V.5. A minimum of two industrial LED fixtures from Columbia Lighting Model LXEM4-40ML-RFA-EDU or equivalent approved by JEA, spring wound timer light switch, prewired distribution circuit, power panel, and duplex receptacles shall be conveniently provided in the enclosure. The light switch and receptacles shall be provided near pump control panel. (For Use on Large Pump Engines. Please note Fixture JEA Standard)
- V.6. Structural wind rating requirement reference 2010 FBCB and ASCE-7-10. JEA requires wind design of 150 miles per hour.
- V.7. Enclosure shall be Phoenix Products, Advanced Manufacturing & Power Systems Inc. or Fidelity Manufacturing.

VI. EXHAUST AND MUFFLER

- VI.1. Each engine-generator unit shall be furnished with complete exhaust system including a stainless steel exhaust silencer, all-stainless steel piping, all-stainless expansion joints and accessories as required for a complete operating system.
- VI.2. The exhaust silencer shall be chamber type, of all-welded Type 316 stainless steel construction with all 316 stainless steel hardware and fasteners.
 - VI.2.1. The silencer shall be of the side inlet type
 - VI.2.2. Secured in position at no less than 4 points
 - VI.2.3. The silencer shall be supported by a welded 316 stainless angle iron cradle; silencer shall be bolted or strapped to cradle and then bolted to the roof support members mounted inside the roof of the enclosure for a horizontal mounting on top of the enclosure.
- VI.3. The silencer shall be sized so that the backpressure at rated capacity of the engine does not exceed one-half the supplier's maximum allowable backpressure. The silencer shall be suitable for critical type silencing and shall be a Maxim "Model M51" or equal.
- VI.4. All exhaust piping shall be Type 304L, Schedule 10S stainless steel, and the exhaust shall discharge horizontally at the silencer outlet, with 45 degree bevel cut with a stainless expanded metal bird screen.
- VI.5. The intake of the silencer shall connect to the flexible exhaust connection by stainless steel pipe. Size as required by engine manufacturer. A flexible stainless steel exhaust adapter, 18 inch minimum length, shall be furnished for mounting between the engine and silencer. The flexible exhaust connection as specified shall mount directly on exhaust manifold and shall be mounted so that no weight is exerted on the manifold at any time.
- VI.6. Each engine-generator unit shall be furnished with complete exhaust system including a stainless steel exhaust silencer, all-stainless steel piping, all-stainless expansion joints and accessories as required for a complete operating system.

VII. FUEL STORAGE TANK**VII.1. DOUBLE WALL SUB-BASE TYPE FUEL STORAGE TANK**

The tank shall be UL listed, vented, and shall normally be used to store the specific petroleum product at atmospheric pressure. The sub-base fuel storage tank shall have a minimum capacity to provide 72 hours uninterrupted operation of the pump –engine at 100 percent capacity. The sub-base tank shall be of welded steel construction throughout and shall be constructed to permit access to the electrical stub up area. The tank shall have an over fill containment box that will hold 3-15 gallons and have a normally closed, hand operated valve to drain over spill content back into tank. The coating of the tank shall meet the coating specifications in section VII.11. The tank shall be electrically grounded and secured to slab with 4-6 stainless steel anchor bolts w/ stainless steel washers and fasteners.

VII.2. ABOVE GROUND FUEL STORAGE TANK

An aboveground stand alone fuel storage tank shall be installed when applicable per the JEA representative. The insulated secondary containment aboveground storage tank system for flammable and combustible liquids shall be vehicle impact protected and projectile resistant. Storage capacity shall be 72 hours rated at maximum fuel consumption. Tank shall be a steel tank housed in a double containment concrete vault/tank. The tank shall be manufactured by “ConVault, Inc.”, Phoenix Products “Envirovault”, or JEA pre-approved equal.

VII.3. UL/ULC LISTING

The tank shall be tested to and listed (and carry UL/ULC labels) for the following:

- VII.3.1. UL - 142, aboveground tanks for flammable and combustible liquids.
- VII.3.2. UL - 2085, two hour furnace fire test and two hour simulated pool fire test for insulated tank.
- VII.3.3. UL - 2085, insulated and protected secondary containment aboveground tanks for flammable and combustible liquids.
- VII.3.4. UL - 2085 and UFC SECTION (79-7) APPENDIX #A-II-F-1, ballistic and vehicle impact test for protected tank.
- VII.3.5. UL - 2085 Non-Metallic Secondary Containment and Venting by Form of Construction.
- VII.3.6. UL CAN/ORD - C 142.16, protected aboveground tank assemblies for flammable and combustible liquids.
- VII.3.7. UL CAN/ORD - C 142.5, concrete encased aboveground tank assemblies for flammable and combustible liquids.
- VII.3.8. UL CAN/ORD - 142.16, the furnace burn requirements for two hour fire rating.
- VII.3.9. UL CAN/ORD - 142.5, the open (pool) fire testing for two hour flammable liquid fire test.
- VII.3.10. UL CAN/ORD - 142.23, aboveground tanks for waste oil.

VII.4. REQUIREMENTS**VII.4.1. Steel Tank Construction**

- VII.4.1.1. Steel tank shall be made of 3/16 inch thick steel. The steel tank shall hold the liquid fuel. The tank shall be made in accordance with UL Standard 142 and ULC Standard S601 covering all aspects of tank fabrication including material specification, fabrication, welding and

testing. The steel tank's exterior shall be coated with primer paint for protection against corrosion.

VII.4.1.2. At the fabrication shop, the tank shall undergo a 24 hour pressure test at 5 psig.

VII.4.2. Secondary Containment

VII.4.2.1. The steel tank shall be wrapped with a minimum of ¼ inch thick Styrofoam (foam) insulation and an impervious barrier of 30 MIL high density polyethylene membrane (poly). The 30 MIL poly shall provide containment for a fuel leak through the steel tank. A leak detector pipe terminating in the secondary containment shall provide positive-proof that the tank is not leaking.

VII.4.2.2. The 30 MIL poly, shall shield and protect the steel tank exterior from coming in direct contact with the concrete and thus minimize the potential of tank external corrosion.

VII.4.3. Concrete Vault

The tank and secondary containment shall then be encased in a 6 inch thick reinforced concrete vault. The 6 inches of concrete shall be poured on all sides, bottom and top of the tank in one step and be monolithic. This process assures that there are no joints and no heat sinks in the concrete to carry heat from a fire into the primary containment.

VII.4.4. Coating and Finishing

The concrete exterior of the tank shall be vacuum coated using a two-part water based epoxy paint to protect the tank from inclement weather conditions. The entire pipe fittings and nipples on the tank shall be coated with Fast Clad DTM Urethane Mastic paint to protect them from corrosion, there shall be an intermediate and finish coat.

VII.4.5. Overfill Protection

The tank shall be provided with the following methods to protect against overfill: (a) direct reading level gauge at the tank which is visible from fill pipe location, Greenleaf EFG 8000-I solar gauge with AC back up mounted on exterior of enclosure and 4-20mA.1 data converter mounted in engine control panel; (b) valve located within fill pipe access to close automatically at a specified fill level.

VII.4.6. Venting

The tank system shall be furnished with a 2 inch normal vent and an emergency pressure relief system. The standard emergency relief system furnished with the tank shall open if the tank pressure exceeds ½ psi. The tank system shall conform to code requirements and UL/ULC Standards for venting. All vents and fittings utilized on the fuel tank shall be constructed of stainless steel.

VII.4.7. Support Legs

Vault shall have support legs that provide visual inspection capability.

VII.4.8. Thermal and Corrosion Protection

The tank construction shall provide thermal insulation to protect against temperature extremes and corrosion by separating the steel tank from the concrete section VII.4.2. No part of the steel tank shall come in direct contact with concrete or any other corrosive material.

VII.4.9. Spill Containment

The tank system shall include a 5 to 15 gallon, 316 stainless steel spill containment surrounding the fill pipe. The spill container shall be equipped with a normally closed, hand-operated valve that can be actuated to drain the spilled fuel liquids into the steel tank.

VII.4.10. Bullet Resistance

The tank shall withstand bullet resistance tests in compliance with UFC Section (79-7), Appendix #A-II-F-1.

VII.4.11. Uplift Restraints

The tank shall be supplied with flood resistant tie-down brackets/hurricane hold-down restraints or bolted down to foundation.

VII.4.12. Fire Extinguisher and Clean-up Kit

Portable fire extinguishers must be provided for the suppression of fires in accordance with NFPA 10 and UFC for high hazard area. Fire extinguisher and clean-up kit shall be sized and provided by the tank manufacturer. Fire extinguisher shall be of the ABC type and mounted on the interior of the enclosure at the control panel with 316 stainless steel bracket and fasteners. Clean-up kit shall be similarly mounted inside the pump-engine enclosure.

VII.4.13. Fuel Piping

VII.4.13.1. There shall be an anti-siphon valve above the manual stainless steel fire-safe shutoff valve on all standalone fuel tanks 551 gallons and above as required per FDEP. All anti-siphon valves must be adjustable and sized for exact rise and run of fuel piping per the site conditions.

VII.4.13.2. The diesel fuel piping shall be standard weight (Schedule 40) 316 stainless steel with socket welded fittings per ASTM standards. At the option of the supplier, use Schedule 40 316 stainless steel with welded fittings. All piping shall be welded and done by a ASME certified pipe welder. Where threaded union is required, within two feet of Antisiphon Valve, use Hercules Chemical Co. "Megaloc or Real-tuff" all-purpose pipe dope on all stainless steel threaded connections. Vendor/ Contractor must warranty all piping connections to be free of any leaks, drips or weeping for one year. As an alternative, flanged fittings with petroleum grade gasket may be used in lieu of a union.(only where a union is required).

VII.4.13.3. Above ground fuel storage tanks that have fill box openings over 60 inches above grade shall have aluminum or stainless steel stairs and platform at the fuel port. Larger base tanks/ enclosures that have a walk-in type enclosure shall have access stairs or ladders that are located on two sides of the enclosure / base tank made of aluminum. The stairs/ platform shall be secured to concrete slab using 316 stainless anchor bolts and washers.

VII.4.13.4. Supplier shall provide 90% of fuel for 72 hour operation, at rated tank capacity for any and all turnkey installations by supplier. Fuel shall be number off road ultra-low sulfur diesel. Fuel delivery shall take place prior to load bank test. Supplier shall treat fuel with Hydro Clean made by Gulf Select.

VII.4.13.5. JEA Maintenance, City of Jacksonville and Environmental Departments including the JEA Project Manager shall be notified by supplier between 45 days and 30 days, and again between 72 hours and 48 hours in advance of above ground fuel storage tank shipments greater than 550 gallons. DEP's Chapter 62-762 for Aboveground Storage Tank Systems shall be followed.

VII.4.14. Installation

VII.4.14.1. Tank shall be installed as per manufacturer's requirements and as per the drawings. Tank shall be installed by qualified personnel who have been approved by the manufacturer and who have knowledge of, and possess the skills and equipment necessary, to install this type of aboveground storage tank properly and safely. Do not handle or move the tank unless it is empty. Under no circumstances should a tank containing petroleum product be moved. Do not drop or drag the tank. After install of tank a two part epoxy touch up paint shall be applied to the exposed metal. All mounting hardware shall be 316 stainless steel.

VII.4.14.2. Installation, operation and maintenance of the tank shall be carried out in accordance with the applicable codes and regulations. These aboveground storage tanks are intended for installation in accordance with NFPA 30, 30A, 31 and UFC Appendix II-F.

VII.5. FOUNDATION

VII.5.1. The foundation for the tank/pump-engine must be designed (and approved by tank manufacturer) to support the tank, pump-engine, and enclosure plus the weight of the maximum amount of product the tank will be storing. The foundation design must also include provision for draining surface water away from the tank to minimize the risk of fuel accumulation under the tank from the overfill or spills.

VII.5.2. The tank foundation's sub-grade shall be over undisturbed earth or compacted fill, free of organic material. Provide a minimum 6 inch thick granular sub-grade, compacted and graded to a level uniform sub-surface prior to the cast slab placement or pouring of the cast-in-place slab. Surface under the foundation shall be flat within 1/16 inch per foot. An alternative to pouring the slab in the field is to purchase a pre-cast slab from the manufacturer.

VII.5.3. The legs of all tanks shall be grouted to provide a uniform load distribution on legs and foundations.

VII.6. ELECTRICAL

VII.6.1. Electrical service and fuel piping to the pumps unit shall be installed in accordance with the requirements of NEC and NFPA and local code requirements.

VII.6.2. All electrical devices used with or located within 20 feet of the fuel tank shall conform to NFPA 70 Hazardous Locations. All electric conduits and wiring connected to the tank shall be explosion proof and in strict accordance with NEC Class-1, Division 1 or local standards, whichever is stricter.

VII.6.3. Electrical grounding is required for flammable liquid fuel tanks. Tanks shall be provided with two grounding lugs welded to the nipples on tank top.

VII.7. TESTING

- VII.7.1. The tank shall be shipped pre-assembled and shop tested. Upon completion of installation, contractor shall pressure test the primary steel tank to 3 psig. This test shall be performed under the supervision and guidance of the manufacturer's representative and in the presence of the JEA's representative.

VII.8. WARRANTY

- VII.8.1. Tank manufacturer shall provide its standard 30 year warranty.

VII.9. TESTS

- VII.9.1. Prior to acceptance of the installation, the emergency pump-engine shall be tested at the job site to show it is free of any defects and will start automatically and pump the design capacity of the station. Per the discretion of the JEA representative the contractor shall be require to pump down the wet well or booster station by pass and no-flow situations.
- VII.9.2. Prior to acceptance, any defects which become evident during this test shall be corrected at no additional expense to JEA.

VII.10. COATINGS

- VII.10.1. Engine, pump, skid/ frame, and any ferrous metal surface not to exceed 150 degree Fahrenheit shall be coated per the following specification or JEA approved equal. Surface preparation: Protect all surfaces from preparation procedures. Solvent clean all surfaces to be coated utilizing Devoe Coatings Devprep 88 Heavy Duty Cleaner per SSPC-SP-1 Cleaning Standard. Abrasive blast per SSPC-SP-6 Commercial Blast as a minimum to all surfaces to be coated. All surfaces shall be clean and dry prior to the applications of all coatings. Any surfaces that are not to be coated shall be protected. Primer Coat: Apply Devoe Coatings Catha-Coat 303H Reinforced Inorganic Zinc Primer applied at 2.0-4.0 mils dry film thickness. Intermediate Coat: Apply Devoe Coatings Bar-Rust 236 Multi-Purpose Epoxy Coating applied at 2.0-4.0 mils dry film thickness. Finish Coat: Apply Devoe coatings Devthane 379UVA Aliphatic Urethane Glass Enamel applied at 2.0-4.0 mils dry film thickness. All ferrous metal that exceed 150 degree Fahrenheit (exhaust manifold and or muffler pipe) must be coated with hi-heat aluminum. Hi-heat aluminum shall be applied to surface prior to any other coating. Once applied cover to protect the surface and do not allow for overspray of other coatings.

VII.11. START-UP

- VII.11.1. On completion of the installation, the initial start-up shall be performed by a factory trained representative of the engine supplier. At the time of start-up, operating instructions and maintenance procedures shall be thoroughly explained to the operating personnel. On turnkey projects the contractor shall be responsible for providing a full tank of fuel for start up and maintain a full tank till unit/ facility is accepted.