

Vendor Name: _____
 Payment Terms: _____
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 Delivery Date: _____
 Ship Via: _____
 Signature: _____

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 - 06/03/14 Freight - Default - Handling Code
 Requested - 06/19/14 Taken By -
 Delivery - Deliveries are accepted 8 a.m. TO 3 p.m.

Description / Supplier Item	UM	Unit Cost	Extension	Req. Dt
GENERATOR-EAST PLANT PUMP STA PER ATTACHED SPECIFICATIONS	1.	EA	EA	06/19/14
TRANSFER SWITCH PER ATTACHED SPECIFICATIONS	1.	EA	EA	06/19/14

NOTES:

1. BIDS FOR THE ITEMS ABOVE WILL BE AWARDED ON TOTAL PRICE OF THE TWO ITEMS.
2. DELIVERY OF THE TRANSFER SWITCH IS REQUIRED PRIOR TO THE DELIVERY OF THE GENERATOR.

 Total Order

**CITY OF OAK RIDGE
SPECIFICATIONS FOR
GENERATOR AND TRANSFER SWITCH
RFQ #139287**

GENERATOR

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. 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 as shown on the plans and drawings and specified herein.
- B. The generator set shall be provided on the basis of a turbocharged diesel driven engine generator set as further described in these specifications.
- C. 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.
- D. The City of Oak Ridge will make all electrical connections.

1.02 REFERENCES AND STANDARDS

- A. The generator set covered by these specifications shall be designed, tested, rated, assembled and installed in strict accordance with all applicable standards below:
1. CSA C22.2, No. 14-M91 Industrial Control Equipment.
 2. EN50082-2, Electromagnetic Compatibility-Generic Immunity Requirements, Part 2: Industrial.
 3. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.
 4. IEC8528 part 4, Control Systems for Generator Sets.
 5. IEC Std 61000-2 and 61000-3 for susceptibility, 61000-6 radiated and conducted electromagnetic emissions.
 6. IEEE446 Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
 7. NFPA 70, National Electrical Code, Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
 8. NFPA 99, Essential Electrical Systems for Health Care Facilities.
 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.

1.03 GENERAL REQUIREMENTS

- A. The generator set will be of the latest commercial design and will be complete with all of the necessary accessories for complete installation as shown on the plans, drawings, and specifications herein.

1.03 GENERAL REQUIREMENTS, continued

B. The equipment supplied and installed shall meet the requirements of the National Electrical Code, along with all applicable local codes and regulations.

C. All equipment shall be new and of current production by a national firm that manufactures 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.

1.04 SUBMITTAL

A. The submittal shall include the following information:

1. Factory published specification sheet showing all standard and optional accessories to be supplied.
2. Manufacturer's catalog cut sheets of all auxiliary components such as battery charger, control panel, enclosure, etc.
3. Dimensional elevation and layout drawings of the generator set, enclosure and related accessories.
4. Weights of all equipment.
5. Concrete pad recommendation, layout and stub-up locations of electrical and fuel systems.
6. Schematic wiring diagrams and Interconnect wiring diagram of complete emergency system, including generator, switchgear, day tank, remote pumps, battery charger, control panel, and remote alarm indications. Diagram should identify by terminal number, each required interconnection between the generator set, the transfer switch, and the control system as required.
7. Engine mechanical data, including heat rejection, exhaust gas flows, combustion air and ventilation air flows, fuel consumption, etc.
8. Generator electrical data including temperature and insulation data, cooling requirements, excitation ratings, voltage regulation, voltage regulator, efficiencies, waveform distortion and telephone influence factor.
9. Manufacturer's and dealer's written warranty.

1.05 FINAL DOCUMENTATION

A. Provide six (6) sets of operation and maintenance manuals covering the generator, switchgear, and auxiliary components. Include final as-built wiring interconnect diagrams and recommended preventative maintenance schedules. Digital (color-pdf) submittals are acceptable for all but one (1) O&M manual.

1.06 TESTING

A. To assure 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 these separate tests: final production tests and site tests.

1. Final Production Tests

Each generator set shall be tested under varying loads with guards and exhaust system in place. Tests shall include:

- a. Single-step load pickup.
- b. Transient and steady-state governing.
- c. Safety shutdown device testing.

1.06 TESTING, continued

- d. Voltage regulation.
- e. Rated Power @ 0.8 PF
- f. Maximum Power.

A certified test record will be sent to the customer prior to shipment.

2. Site Tests

An installation check, start-up, and building load test shall be performed by the manufacturer's local representative. The Owner, regular operators, and the maintenance staff shall be notified of the time and date of the site test. The tests shall include:

- a. Fuel, lubricating oil, and antifreeze shall be checked for conformity to the manufacturer's recommendations, under the environmental conditions present and expected.
- b. 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 annunciator, etc.
- c. Start-up 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.
- d. Automatic start-up by means of 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 voltage, amperes, and frequency shall be monitored throughout the test. An external load bank shall be connected to the system to load the generator to the nameplate kW rating.

PART 2 – PRODUCT SPECIFICATIONS

2.01 GENERAL REQUIREMENTS

- A. The generator set shall be Standby Duty rated at 510 KW 1800 RPM, 0.8 power factor, 480 V, 3-Phase, 4-wire, 60 hertz, including radiator fan and all parasitic loads. Generator set shall be sized to operate at the specified load at a maximum ambient of 104°F (40°C) and 1000 feet above sea level.
- B. The generator set shall be capable of starting motor loads of 886 kVA inrush, with a maximum voltage dip of 20%. Engine brake horsepower shall be sufficient to deliver full rated generator set kW/kVA when operated at rated rpm and equipped with all engine-mounted parasitic and external loads such as radiator fan and power generator.
- C. Vibration isolators shall be provided between the engine-generator and heavy-duty steel base.
- D. The generator set shall be sound attenuated to a level suitable for a residential area.
- E. The generator set shall be Kohler or Caterpillar.

2.02 ENGINE

- A. The engine shall be diesel fueled, four (4) cycle, water-cooled, while operating with nominal speed not exceeding 1800 RPM.

2.02 ENGINE, continued

- B. The engine shall be equipped with the following:
1. The engine governor shall be an electronic Engine Control Module (ECM) with 24-volt DC Electric Actuator.
 2. Steady-state frequency regulation shall be +/- 0.25%.
 3. Speed droop shall be adjustable from 0 (isochronous) to 10%, from no load to full rated load.
 4. 24VDC positive engagement solenoid shift-starting motor.
 5. 70-ampere automatic battery charging alternator with a solid-state voltage regulation. Batteries shall be heavy duty lead acid type.
 6. Positive displacement, full-pressure lubrication oil pump, cartridge oil filters, dipstick, and oil drain.
 7. Dry-type replaceable air cleaner elements for normal applications.
 8. Engine-driven or electric fuel-transfer pump including fuel filter and electric solenoid fuel shutoff valve capable of lifting fuel.
- C. The turbocharged engine shall be fueled with No. 2 diesel. Diesel engines shall be able to deliver rated power where generating on No. 2 diesel fuel having 35 degrees API (16c, 60F) specific gravity.
- D. The fuel system shall be integral with the engine. In addition to the standard fuel filters provided by the engine manufacturer, there shall also be installed a primary fuel filter/water separator in the fuel inlet line to the engine. All fuel piping shall be black iron or flexible fuel hose rated for this service. No galvanized piping will be permitted. Flexible fuel lines shall be minimally rated for 300 degrees F and 100 psi.
- E. The generator set shall be equipped with a rail-mounted, engine-driven radiator with blower fan and all accessories. The cooling system shall be sized to operate at full load conditions and 120 F° ambient air entering the enclosure. The generator set supplier is responsible for providing a properly sized cooling system based on the enclosure static pressure restriction.
- F. The engine shall be EPA certified from the factory.
- G. Engines shall start, achieve rated voltage, and freeway, and be capable of accepting load within 10 seconds of detected power interruption.

2.03 ALTERNATOR

- A. The alternator shall be salient-pole, brushless, 2/3-pitch, 10 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.

2.03 ALTERNATOR, continued

- B. The alternator shall have a single maintenance-free bearing, designed for 40,000 hour B10 life. The alternator shall be directly connected to the flywheel housing with a semi-flexible coupling between the rotor and the flywheel.
- C. 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.

2.04 CONTROLLER

- A. Standards
1. The generator set controller shall meet NFPA-110 Level 1 requirements (1999 version) and shall have an integral alarm horn as required by NFPA.
 2. The controller shall meet NFPA-99 and NEC requirements.
 3. The controller shall be UL 508 listed.
 4. The controller shall be standard for the generator set provided.
- B. Environmental
1. The controller shall be tested and certified to the following environmental conditions.
 - a. -40°C to +70°C operating temperature range
 - b. 5-95% humidity, condensing
- C. Functional Requirements
1. The following functionality shall be integral to the control panel.
 - a. The control shall include a LCD display with text based alarm/event descriptions.
 - b. Audible horn for alarm and shutdown with horn silence switch
 - c. Remote start/stop control
 - d. Local run/off/auto control integral to system microprocessor
 - e. Lamp test
 - f. Emergency stop push button
- D. Control Functional Requirements
1. Field programmable time delay for engine start. Adjustment range, 0-5 minutes in 1 second increments.
 2. Field programmable time delay engine cool down. Adjustment range, 0-10 minutes in 1-second increments.
 3. Output for overcurrent if the generator reaches a user programmable percentage of its kW rating. Load shed must also be enabled if the generator output frequency falls below 59 Hz (60 Hz system) or 49 Hz (50 Hz system).
 4. Programmable cyclic cranking that allows up to six crank cycles and up to 45 seconds of crank time per crank cycle.
- E. Monitoring Requirements
1. All monitored functions must be viewable on the digital display.
 2. The following generator functions must be monitored:
 - a. Generator AC voltages – Line to Line, Line to Neutral, Average, 1.0% accuracy
 - b. Generator AC currents – Per phase and Average, 1.0% accuracy
 - c. Generator AC frequency, 1.0 accuracy
 3. Engine parameters listed below shall be monitored:
 - a. Coolant Temperature

2.04 CONTROLLER, continued

- b. Oil Pressure
- c. Battery Voltage
- d. Engine RPM

4. The control shall monitor and provide alarm indication and subsequent shutdown for the following conditions. All alarms and shutdowns are accompanied by an engine hour stamp that is stored by the control panel for first and last occurrence.

The following will cause an Engine Alarm/Shutdown:

- a. High coolant temperature alarm/shutdown
- b. Watchdog (CPU Functioning) shutdown
- c. Low oil pressure alarm/shutdown
- d. Loss of coolant shutdown
- e. Overcrank shutdown
- f. Overspeed shutdown
- g. Low coolant temperature alarm

The following will cause a Generator Alarm/Shutdown:

- a. Generator phase sequence
- b. Generator over voltage
- c. Generator under voltage
- d. Generator over frequency
- e. Generator under frequency

5. The following must be programmable from the controller keypad:

- a. time delay settings
- b. generator run time (0 to 72 hours) - exercise
- c. load shed
- d. engine start
- e. engine cool down
- f. overvoltage and undervoltage delays
- g. crank on and crank pause time
- h. idle time
- i. trip point settings:
- j. high battery voltage
- k. low battery voltage
- l. overspeed
- m. underfrequency
- n. overfrequency
- o. overvoltage
- p. undervoltage

F. PLC Interface

1. Generator set interface to the PLC based control system hardwired I/O shall include:

- a. Generator Run Status
- b. Generator Fault
- c. Generator Low Fuel

2.05 ACCESSORIES

- A. Provide a generator mounted molded case type circuit breaker, 80% rated, 600 amp trip, 3 pole with neutral and ground lugs. The breaker shall be UL/CSA Listed and connected to engine/generator safety shutdowns. Breaker shall be housed in an extension terminal box which is isolated from vibrations induced by the generator set. Mechanical type lugs, sized for the circuit breaker feeders shown on drawing, shall be supplied on the load side of breaker.
- B. Engine block heater: 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.
- C. Critical Silencer. A residential grade silencer, companion flanges, and flexible stainless steel exhaust fitting properly sized shall be furnished and installed according to the manufacturer's recommendation. 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).

2.06 ENCLOSURE - WEATHER PROTECTED AND SOUND ATTENUATED

- A. The enclosure must provide security from vandals and be aesthetically pleasing as well. In addition the enclosure must meet applicable National Electric Code (NEC) and National Fire Protection Association (NFPA) codes relating to clearances of all items included with the Generator Set.
- B. The performance of the enclosure must be in accordance with the Generator Set's specific requirements for cooling and combustion airflow.
- C. Clearances must be adequate for maintenance personnel and/or doors must be located such that service personnel have adequate access.
- D. The enclosure will be of Modular construction allowing complete flexibility in design and use. The enclosure must be capable of being modified in the factory or after installation to meet various field conditions.
- E. All enclosures are to be constructed from high strength, low alloy steel, aluminum or galvanized steel.
- F. 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.
- G. The enclosure must be capable of withstanding a 120 mph wind. Intake louvers and enclosure overall must be able to maintain less the .01 ounces of moisture penetration per square foot of louver free area during a 4"/hr rainfall.
- H. Lifting provisions must be provided in the base that enable the complete Gen-set with the enclosure to be lifted without damage.
- I. The enclosure roof shall be pitched to prevent accumulation of water. The roof section shall be guttered.
- J. The roof must be capable of supporting the largest commercially available silencer recommended for this particular model Gen-set.
- K. All doors shall be cross-braced to provide the maximum strength possible and to maintain alignment. Door seals are to be rubber material that is non-hydroscopic and will not allow the doors to freeze shut.
- L. Doors must be hinged with stainless steel hinges and hardware and be removable.
- M. Doors shall be equipped with lockable latches. Locks must be keyed alike.
- N. Exhaust silencer(s) shall be mounted above the roof using heavy-duty 7 gage powder-coated brackets.

2.06 ENCLOSURE - WEATHER PROTECTED AND SOUND ATTENUATED, continued

- O. The exhaust system shall include a roof penetration section that will eliminate rain or water run-off from entering the enclosure.
- P. Gas-proof, seamless, stainless steel, flexible exhaust bellows with threaded NPT connection.
- Q. Engine crankcase emission canister shall be included.
- R. The generator set shall be sound attenuated to a level suitable for a residential area. The generator set shall be provided with a sound attenuated enclosure and shall also include an exhaust silencing system and an air intake silencing system. The overall sound attenuating enclosure design shall reduce sound levels to an acceptable level for a residential area not exceeding 75dB(A) at 23 feet (7meters).

2.07 DOUBLE WALL SUB BASE FUEL TANK

- A. Provide a double wall sub-base tank constructed to meet all local codes and requirements. A fuel tank base of 24 hour capacity shall be provided as an integral part of the enclosure. It shall be contained in a rupture basin with 110% capacity. A locking fill cap, a mechanical reading fuel level gauge, low fuel level alarm contact, and fuel tank rupture alarm contact shall be provided.
 - 1. The sub base fuel system is listed under UL 142, sub section entitled Special Purpose Tanks EFVT category, and will bear their mark of UL Approval according to their particular classification.
 - 2. 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 Combustion Engine and Gas Turbines—NFPA 37, and Emergency and Standby Power Systems—NFPA 110.
- B. Construction:
 - 1. Primary Tank
 - a. 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.
 - 2. Steel Channel Support System
 - a. Reinforced steel box channel for generator support, with a load rating of 5,000 lbs. per gen set mounting hole location. Full height gussets at either end of channel and at gen set mounting holes shall be utilized.
 - 3. Exterior Finish
 - a. 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.
- C. Venting:
 - 1. 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. A 1 -1/4" atmospheric mushroom cap shall be furnished and the installing contractor shall pipe above the highest fill point as a minimum

2.07 DOUBLE WALL SUB BASE FUEL TANK, continued

- D. Emergency Venting
 - 1. 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. A zinc plated emergency pressure relief vent cap shall be furnished for the primary tank. The vent is spring-pressure operated: opening pressure is 0.5/psig and full opening pressure is 2.5 psig. Limits are stamp marked on top of each vent. The emergency relief vent is sized to accommodate the total venting capacity of both normal and emergency vents.
- E. Fuel Fill:
 - 1. There shall be a 2" NPT opening within the primary tank with an 8" raised fill pipe and lockable manual fill cap.
- F. Fuel Level:
 - 1. A direct reading, UL listed, magnetic fuel level gauge with a hermetically-sealed vacuum tested dial to eliminate fogging shall be provided.
- G. Low Fuel Level Switch
 - 1. Consists of a 50 watt float switch for remote or local annunciation of a (50% standard) low fuel level condition.

2.08 QUALITY ASSURANCE

A. The complete power generation system, including engine, generator, and switchgear, shall be the product of one manufacturer who has been regularly engaged in the production of complete generating systems for a least twenty (20) years. All components shall have been designed to achieve optimum physical and performance compatibility and prototype tested to prove integrated design capability. The complete system shall have been factory fabricated, assembled, and production tested. The naming of a specific manufacturer does not waive any requirements of this specification. Any exceptions or variations must be noted and shall be subject to the approval of the Owner.

2.09 RESPONSIBILITY

A. The responsibility for performance to this specification shall not be divided among individual component manufacturers, but must be assumed solely by the primary manufacturer. This includes generating system design, manufacture, test, and having a local supplier responsible for service, parts, and warranty for the total system.

2.10 MINIMUM SERVICE AND WARRANTY QUALIFICATIONS

- A. The manufacturer shall have a local authorized dealer who can provide factory-trained servicemen, the required stock of replacement parts, technical assistance, and warranty administration.
- B. The engine-generator supplier shall maintain 24-hour parts and service capability within 100 miles of the project site. The distributor shall stock parts as needed to support the generator set package for this specific project. The supplier must carry sufficient inventory to cover no less than 80% parts service within 24hrs and 95% within 48 hours.

2.10 MINIMUM SERVICE AND WARRANTY QUALIFICATIONS, continued

C. The manufacturer shall provide a factory representative to instruct the Owner's personnel in the installation of the unit and, to inspect the installation once it is completed. Provide a minimum of eight (8) hours on-site time, broken into two 4-hour increments.

2.11 WARRANTY TERMS

A. The manufacturer's and dealer's warranty shall in no event be for a period of less than two (2) years from date of initial start-up of the system and shall include repair parts, labor, reasonable travel expense necessary for repairs at the jobsite, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of repair. Running hours shall not be a limiting factor for the system warranty by either the

2.11 WARRANTY TERMS, continued

manufacturer or servicing dealer. Submittals received without written warranties as specified will be rejected in their entirety.

2.12 CONTRACT MAINTENANCE

A. The system manufacturer's authorized dealer shall furnish the owner with a copy of any contract maintenance agreement negotiated relative to the equipment specified in this section. The contract information shall detail agreed maintenance intervals, work to be performed at each interval, reimbursement schedule for maintenance work, and owner's responsibilities versus dealer's responsibilities.

2.13 TRAINING

A. Furnish the services of a factory-authorized service representative to instruct owner's personnel in the operation, maintenance, and adjustment of the generator and related equipment. Provide a minimum of eight (8) hours instruction scheduled seven (7) days in advance.

AUTOMATIC TRANSFER SWITCH

NOTE: Delivery of transfer switch is required PRIOR to delivery of the generator.

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. This section provides specification requirements for an automatic transfer switch herein identified as ATS unit.
- B. The automatic transfer switch (ATS) manufacturer shall furnish, field test, adjust and certify the installed ATS unit for satisfactory operation.
- C. The ATS unit shall be capable of handling the full load output from the generator specified in this document.
- D. Any exceptions or deviations to this specification shall be indicated in writing and submitted with the quotation.

1.02 SUBMITTALS

- A. Six (6) copies of approval drawings shall be furnished for the Owner's approval prior to factory assembly of the ATS unit. These drawings shall consist of elementary power and control wiring diagrams, panel layout and front elevation drawings.
- B. Front elevation drawings shall include dimensions for panel front view, top and bottom conduit entry locations, ATS enclosure description and ratings, overall weight and anchoring points.
- C. Elementary wiring diagrams shall include all power and control components packaged within the ATS enclosure and documentation of any non-default settings programmed at the factory.
- D. Submit with the delivery of the ATS an Installation and Maintenance Manual and one (1) copy of the manufacturer's drawings per shipping block.

1.03 REGULATORY REQUIREMENTS

Automatic Transfer Switches referenced herein are designed and manufactured according to the following appropriate specifications.

- A. UL 1008 - Transfer Switch Equipment
- B. NFPA 110 - Emergency and Standby Power Systems
- C. NFPA 70 - National Electrical Code (NEC).
- D. ANSI C84.1 – Electric Power Systems and Equipment - Voltages Ratings (60Hz).
- E. NEMA ICS 1 – Industrial Control and Systems General Requirements
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- G. UL 508 - UL Standard for Safety for Industrial Control Equipment.
- H. UL 50 - UL Standard for Safety for Enclosures for Electrical Equipment.

1.04 WARRANTY

- A. The ATS unit shall be warranted by the manufacturer to be free from defects in materials and workmanship for a period of twelve (12) months from date of start up.

1.05 QUALITY ASSURANCE

- A. The ATS unit shall be manufactured by one supplier in an ISO 9001 certified facility.
- B. The ATS unit and all associated optional equipment shall be UL listed and labeled. A UL label shall be attached inside each soft start controller unit as verification.
- C. The ATS unit shall be designed, constructed and tested in accordance with UL, CSA, NEMA & NEC standards and shall be third party certified by UL, CSA and NOM.
- D. The manufacturer of the ATS unit shall have been specialized in the design and production of ATS unit for a period of at least 10 years.
- E. All factory supplied options shall be completely tested for successful operation before shipment.
- F. Quality Assurance documentation shall be furnished to the Owner to verify successful completion of the above tests.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. The ATS unit shall be ASCO or Owner approved equal.

2.02 GENERAL DESCRIPTION

- A. Automatic Transfer Switch with Microprocessor Control shall include the following:
 - 1. Open transition operation only.
 - 2. Time delay to override momentary normal source outages to delay all transfer switch and engine starting signals. Adjustable from 0.5 to 6 seconds.
 - 3. Transfer to alternate time delay. Adjustable from 0 to 5 minutes.
 - 4. Re-transfer to normal time delay which is automatically bypassed if alternate fails and normal is available. Adjustable from 0.5 to 30 minutes.
 - 5. Unloaded running time delay for engine generator cool down. Adjustable from 0 to 30 minutes.
 - 6. Close differential voltage sensing of all phases of normal source. Pickup adjustable from 85% to 100% of nominal and dropout adjustable from 75% to 98% of the pickup value.
 - 7. Single-phase voltage sensing and frequency sensing of alternate source. Voltage pickup adjustable from 85% to 100% of nominal. Frequency pickup adjustable from 90% to 100% of nominal.
 - 8. Momentary type test switch with gold plated low voltage contacts to simulate normal source failure.
 - 9. Two-pole double throw contacts that close when normal source fails and two-pole double contacts that open when normal source fails. Gold plated for low voltage engine start signal or other customer use. Rated 10 amperes, 32 VDC.
 - 10. Green signal light indicates ATS is connected to normal source. Red signal light indicates ATS is connected to alternate source.
 - 11. One auxiliary contact closed when ATS is connected to normal. Rated 10 amperes, 480 VAC. One auxiliary contact closed when ATS is connected to alternate. Rated 10 amperes, 480 VAC.
 - 12. Selection of manual or automatic re-transfer to normal.
 - 13. A 7-day programmable exercise circuit to automatically test operation of the transfer switch and generator set on a programmed time cycle.

2.03 ENVIRONMENTAL RATINGS

- A. The ATS unit shall be housed in a NEMA Type 12 enclosure and will be located indoors.
- B. The ATS unit shall be designed to operate at an ambient temperature from -20°C to +70°C (-4°F to 158°F).
- C. The storage temperature range shall be -40°C to +85°C (-40°F to 185°F).
- D. The ATS unit shall be designed to operate with relative humidity of 5% to 95% non-condensing.
- E. The ATS unit shall be rated to operate at altitudes less than or equal to 3,300 feet (1000 m).

2.04 ELECTRICAL RATINGS

- A. The ATS unit shall be designed to operate from an input voltage of 480 VAC ±10%.
- B. The ATS unit shall operate from an input voltage frequency range from 57 to 63Hz.
- C. The ATS shall be service entry rated for 600 amps.
- D. The ATS shall have 4-poles with switched neutral.

2.05 CONTROL INTERFACE

- A. ATS interface to the PLC based control system with hardwired I/O shall include:
 - 1. Transfer Switch Normal
 - 2. Transfer Switch Emergency

PART 3 – EXECUTION

3.01 INSPECTION

- A. Owner to verify that the location is ready to receive work and the dimensions are as indicated.

3.02 PROTECTION

- A. Before and during the installation, the ATS shall be protected from site contaminants.

3.03 INSTALLATION

- A. Installation shall be in compliance with manufacturer's instructions, drawings and recommendations.
- B. The ATS unit manufacturer shall provide a factory certified technical representative to supervise the contractor's installation, testing and start-up interface with the Variable Frequency Drive unit(s) furnished under the Motor Control Center contract. The duration is for a minimum of one (1) eight hour day (on site).

3.04 TRAINING

- A. An on-site training course of one(1) training day shall be provided by a representative of the ATS unit manufacturer to plant and/or maintenance personnel.