

SECTION 26-32-13
ENGINE GENERATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Packaged engine generator set.
- B. Exhaust silencer and fittings.
- C. Integral fuel tank.
- D. Remote control panel.
- E. Battery charger.
- F. Weatherproof enclosure.

1.02 REFERENCE STANDARDS

- A. NECA/EGSA 404 - Recommended practice for installing generator sets; National Electrical Contractors Association; Current Edition.
- B. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2009, Revision 1 - 2010.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; Current Edition.
- D. NFPA 110 - Standard for Emergency and Standby Power Systems; National Fire Protection Association; Current Edition.

1.03 SUBMITTALS

- A. Shop Drawings: Indicate the following minimum information on shop drawings:
 - 1. Indicate electrical characteristics and connection requirements.
 - 2. Show plan and elevation views with overall and interconnection point dimensions.
 - 3. Indicate fuel consumption rate curves at various loads.
 - 4. Indicate ventilation and combustion air requirements.
 - 5. Show electrical diagrams including schematic and interconnection diagrams.
- B. Product Data: Provide data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, control panel, battery, battery rack, battery charger, exhaust silencer, vibrations isolators, day tank and remote radiator.

- C. Test Reports: Indicate results of performance testing.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation and starting of product.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Operation Data: Include instructions for normal operation.
- G. Maintenance Data: Include instructions for routine maintenance requirements, service manuals for engine and day tank, oil sampling and analysis for engine wear and emergency maintenance procedures.

1.04 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with three (3) years documented experience with service facilities within 100 miles of Project.
- C. Supplier Qualifications: Authorized distributor of specified manufacturer with minimum three (3) years documented experience.
- D. Products: Furnish products listed and classified by Underwriters Laboratories or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.
- E. Designed for seismic risk area.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Accept unit on site on skids. Inspect for damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Caterpillar Inc.: (www.caterpillar.com)
- B. Cummins Engine Company: (www.cummins.com).
- C. Generac: (www.generac.com).
- D. Or approved alternate

2.02 PACKAGED ENGINE GENERATOR SYSTEM

- A. Description: NFPA 110, engine generator system to provide source of power for Level 1 applications and NFPA 110.
- B. System Capacity: Standby 230 kW, 287 kVA at elevation 300 feet above sea level, continuous rating using engine-mounted radiator.

2.03 ENGINE

- A. Type: Air-cooled inline or V-type, four stroke cycle, compression ignition diesel internal combustion engine.
- B. Rating: Sufficient to operate under 10 percent overload for one hour in an ambient of 110 degrees F at elevation of 300 feet.
- C. Fuel System: No. 2 fuel oil.
- D. Engine Speed: As required by manufacturer for specific generator.
- E. Governor: Electronic governor.
- F. Safety Devices: Engine shutdown on low coolant level, low fuel level, high oil temperature, low oil pressure, over-speed and engine over-crank. Limits as selected by manufacturer.
- G. Engine Starting: DC Starting system with positive engagement, number and voltage of starter motors in accordance with manufacturer's instructions. Include remote starting control circuit, with MANUAL-OFF-REMOTE selector switch on engine-generator control panel.
- H. Engine Jacket Heater: Thermal circulation type water heater with integral thermostatic control, sized to maintain engine jacket water at 90 degrees F, and suitable for operation on 120, 208, 277, or 480 volts AC.
- I. Radiator: Radiator using glycol coolant, with blower type fan, sized to maintain safe engine temperature in ambient temperature of 110 degrees F. Radiator air flow restriction 0.5 inches of water maximum.
- J. Engine Accessories: Fuel filter, lube oil filter, intake air filter, lube oil cooler, fuel transfer pump, fuel priming pump, gear-driven water pump. Include fuel pressure gage, water temperature page, and lube oil pressure gage on engine/generator control panel.
- K. Mounting: Provide unit with suitable spring-type vibration isolators for base mounted tank.

2.04 GENERATOR

- A. Generator: NEMA MG 1, three phase, four pole, reconnectable brushless synchronous generator with brushless exciter.

- B. Insulation Class: F.
- C. Temperature Rise: 130 degrees C Standby.
- D. Enclosure: NEMA MG 1, open drip proof.
- E. Voltage Regulation: Include generator-mounted volts per hertz exciter-regulator to match engine and generator characteristics, with voltage regulation +/- 1 percent from no load to full load. Include manual controls to adjust voltage drop, voltage level (+/- 5 percent) and voltage gain. Maximum allowable voltage dip of 20% for "100% full load drop test".

2.05 ACCESSORIS

- A. Skid-Mounted Fuel Tank: Size for 24 hour continuous operation at full load.
- B. Exhaust Silencer: Residential type silencer, with muffler companion flanges and flexible stainless steel exhaust fitting, sized in accordance with engine manufacturer's instructions.
- C. Batteries: Heavy duty, diesel starting type lead-acid storage batteries, 170 ampere-hours minimum capacity. Match battery voltage to starting system. Include necessary cables and clamps.
- D. Battery Tray: Treated for electrolyte resistance, constructed to contain spillage.
- E. Battery Charger: Current limiting type designed to float at 2.17 volts per cell and equalize at 2.33 volts per cell. Include overload protection, full wave rectifier, DC voltmeter and ammeter, and 120 volts AC fused input. Provide factory assembled inside generator enclosure.
- F. Line Circuit Breaker:
 - 1. Molded case electronic trip circuit breaker on generator output with LSI trip adjustment for each pole, sized in accordance with NFPA 70; UL listed. (Adjustment for LTPU, LTD, STPU, STD and Instantaneous)
 - 2. Include battery-voltage operated shunt trip, connected to open circuit breaker on engine failure. Unit mount in enclosure to meet NEMA 250, Type 1 requirements.
- G. Engine-Generator Control Panel: NEMA 250, Type 1 generator mounted control panel enclosure with engine and generator controls and indicators. Include provision for padlock and the following equipment and features:
 - 1. Frequency Meter: 45-65 Hz. Range, 3.5 inch dial.
 - 2. AC Output Voltmeter: 3.5 inch dial, 2% accuracy, with phase selector switch.
 - 3. AC Output Ammeter: 3.5 inch dial, 2% accuracy, with phase selector switch.
 - 4. Output voltage adjustment.

5. Push-to-start indicator lamps, one each for low oil pressure, high water temperature, over-speed, and over-crank.
 6. Engine start/stop selector switch.
 7. Engine running time meter.
 8. Oil pressure gage.
 9. Water temperature gage.
 10. Emergency Stop.
 11. Auxiliary Relay: 3PDT, operates when engine runs, with contact terminals prewired to terminal strip.
 12. Additional visual indicators and alarms as required by NFPA 110.
 13. Remote Alarm Contacts: Pre-wire SPDT contacts to terminal strip for remote alarm functions required by NFPA 110.
- H. Remote Annunciator Panel: Surface mounted panel with painted finish, white color. Provide audible and visible indicators and alarms required by NFPA 110 for level 1 monitoring
- I. LON Network Interface.
1. Provide remote Network Monitoring (basis of design shall be iWatch by Cummins Power Generation).
 2. Remote monitoring services are NOT allowed.
- J. Remote Emergency Stop: Mount NFPA 110 required remote emergency stop switch as required.
- K. Weather-Protective Enclosure, Residential Rated Sound Attenuation: Reinforced steel or aluminum housing allowing access to control panel and service points, with lockable doors and panels. Include fixed louvers, fuel tank, battery rack, battery charger, 120V GFCI maintenance receptacle, maintenance fixture (120 or 277 V) and silencer. Maximum of 78db at 23-feet. Enclosure and paint system shall be designed for coastal, exterior use (salt air environment). Utilize powder coat or electroless nickel paint.
1. Provide enclosure color options with Bid. Owner will provide color choice at time of award.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide the services of manufacturer's representative to prepare and start system.
- B. Provide field inspection and testing in accordance NFPA 110.
- C. Provide full load test utilizing portable test bank for four hours minimum. Simulate power failure including operation of transfer switch, automatic starting cycle, and automatic shutdown and return to normal.
- D. Test alarm and shutdown circuits by simulating conditions.

- E. Building shall have emergency power within 10-seconds after power failure (or voltage/ phase out of range specified).
- F. Adjust generator output voltage and engine speed.
- G. Verify shaft and openings are of correct size and within tolerances.
- H. Arrange for temporary electrical power to be available for installation work and testing of elevator components.

END OF SECTION

SECTION 26-36-00

TRANSFER SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Automatic Transfer Switch.

1.02 REFERENCE STANDARDS

- A. NEMA ICS 10 - Industrial Control and Systems: AC Transfer Switch Equipment; National Electrical Manufacturers Association; Current Edition.
- B. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; Current Edition.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; Current Edition.
- D. NFPA 110 - Standard for Emergency and Standby Power Systems; National Fire Protection Association; Current Edition.

1.03 SUBMITTALS

- A. Product Data: Provide catalog sheets showing voltage, switch size, ratings and size of switching and overcurrent protective devices, operating logic, short circuit ratings, dimensions, and enclosure details.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation and starting of product.
- C. Operation Data: Instructions for operating equipment under emergency conditions when engine generator is running.
- D. Maintenance Data: Routine preventive maintenance and lubrication schedule. List special tools, maintenance materials, and replacement parts.

1.04 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with three (3) years documented experience with service facilities within 100 miles of Project.

- C. Supplier Qualifications: Authorized distributor of specified manufacturer with minimum three (3) years documented experience.
- D. Products: Furnish products listed and classified by Underwriters Laboratories or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Eaton Corporation; Cutler-Hammer Products; (www.eaton.com)
- B. Cummins Engine Company: (www.cummins.com).
- C. Square D: (Schneider Electric).
- D. Or approved Alternate

2.02 AUTOMATIC TRANSFER SWITCH

- A. Description: NEAM ICS 10, automatic transfer switch.
- B. Configuration: Electrically operated, mechanically held transfer switch.
- C. Ampacity: 1200 amp.
- D. Voltage: 120/208, 3 phase.
- E. Interrupting Capacity: 100 percent of continuous rating.
- F. Withstand Current Rating: 20,000 rms symmetrical amperes, when used with molded case circuit breaker.

2.03 SERVICE CONDITIONS

- A. Service Conditions: NEMA ICS 10.
- B. Altitude: Elevation of 300 feet.

2.04 COMPONENTS

- A. LED Indicating Lights: Mount in cover of enclosure to indicate NORMAL SOURCE AVAILABLE, ALTERNATE SOURCE AVAILABLE, and SWITCH POSITION.
- B. Test Switch: Mount in cover of enclosure to simulate failure of normal source.
- C. Return to Normal Switch: Mount in cover of enclosure to initiate manual transfer from alternate source to normal source.

- D. Transfer Switch Auxiliary Contacts: Two normally open; two normally closed.
- E. Normal Source Monitor: Monitor each line of normal source voltage and frequency; initiate transfer when voltage drops below 85% or frequency varies more than 3 percent from rated nominal value.
- F. Enclosure: ICS 10, Type 1, finished with manufacturer's standard gray enamel.

2.05 AUTOMATIC SEQUENCE OF OPERATION

- A. Initiate Time Delay to Start Alternate Source Engine Generator: Upon initiation by normal source monitor.
- B. Initiate Retransfer Load to Normal Source: Upon permission by normal source monitor.
- C. Time Delay Before Transfer to Normal Power: 0 to 30 minutes, adjustable; Set at 15 minutes.
- D. Time Delay Before Engine Shut Down: 0 to 30 minutes, adjustable, of unloaded operation. Set at 5 minutes.
- E. Engine Exerciser: Start engine every 30 days; run for 30 minutes under load before shutting down. Bypass exerciser control if normal source fails during exercising period.
- F. Retransfer to Normal: Synchronize with normal power and "Make Before Break" retransfer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide the services of manufacturer's representative to check out transfer switch connections and operation and place in service.
- B. Provide inspections and tests listed in NETA STD ATS, Section 7.22.3.

END OF SECTION