

263000 Facility Electrical Power – Generating and Storing Equipment

Sections Included In This Standard:

- 1.1 Emergency Power Generators
- 1.2 Automatic Transfer Switches
- 1.3 Uninterruptable Power Sources
- 1.4 Emergency Generators

1.1 EMERGENCY POWER GENERATION

A. GENERATOR REQUIREMENTS:

1. The type of fuel shall be limited to natural gas or diesel fuel. Preference shall be given to diesel fuel prime movers.
2. Generators shall be at ground level and installed so as to be accessible for maintenance and operation and include a ~~120~~ 208 volt single phase/20 amp outlet and a hose bib for cleaning purposes within ten feet of the generator. Generators shall be mounted on a raised concrete base using vibration insulators.
3. If generator is mounted in an exterior weatherproof enclosure, more than 36" off the ground,
 - a. and has no ability to enter the enclosure, a catwalk (with ladder or stairs to each landing section) will be installed to allow access to all service locations on the generator. The width of the catwalk shall be sufficient to fully open access doors and allow maintenance.
 - b. and has the ability to enter the enclosure, stairs and platforms will be located at all entrance locations. The width of the platform shall be sufficient to fully open access doors and allow maintenance.
4. All electrical connections to the unit shall have a section of flexible conduit for vibration isolation.
5. If unit is installed inside a building, then a floor drain shall be installed near the unit.
6. Provision shall be made for sufficient cooling for generators mounted inside buildings.
7. A drip pan shall be installed under unit to collect oil and fuel spills. Integral drip pans are allowed.
8. Battery charger shall have float and equalizing charge capabilities. Equalizing charge shall have a timer capable of timing up to 24 hours with automatic float reset.
9. Unit shall have a drain with a gate valve accessible from the outside of any enclosure for draining oil.
10. Provide meters for voltage (with phase selector switch), frequency, running time, amperage (with phase selector switch).
11. Provide indicator lamps, with test switches, for low oil level, approach low oil level, low

water temp, high water temp., approach high water temp., switch "off", over-crank shutdown, over-speed shutdown.

12. Provide voltage-adjusting rheostat.
13. Provide remote alarm for over-crank and over-speed, with switches for alarm reset.
14. Manufacturers' requirements that are more stringent shall supersede these Standards.
15. Generator sizing shall be sufficiently large enough to handle starting currents of all connected motors with no appreciable effect on generator voltage output. This includes elevator motors.
16. All new emergency generator purchases must be reported to EH&S prior to the generator being installed to ensure compliance with the fuel tank registration mandates of the State of Florida.
17. All new generators shall have load bank connection points.
 - a. These connection points shall be female type cam locks rated for generator size.
 - b. Shall be connected to the building side of the disconnect for the generator.
 - c. Shall be wired to allow the building to be fed through the cam locks in the event of a generator failure.
18. All new generators shall have a minimum 5 year warranty
19. Acceptable Manufacturers: Caterpillar, Cummins-Onan, Detroit Diesel/MTU, Kohler, Generac

B. DIESEL GENERATORS

1. Fuel tank shall be an integral part of generator equipment when outside. If generator is installed indoors, diesel tank shall be installed aboveground. Fuel tank shall be filled with fuel by project at Substantial Completion, prior to acceptance by the University.
2. Locate tank so as to facilitate taking fuel level readings and performing other tasks which may require access to the inside of the storage tank through the filler neck.
3. Diesel tanks shall be capable of holding sufficient fuel for running under full load for a minimum of 48 hours or at half load for a minimum of 96 hours, whichever is less. Tanks shall be double wall, FM/UL listed with interstitial space and liquid monitor.
4. Day tank shall have an electric pump with pump test switch, automatic level control switches, overflow return to main tank, and fuel capacity for four hours running time.
5. Galvanized pipes, fittings and tanks shall not be used on diesel fuel systems.
6. Diesel storage tanks and associated piping shall comply with EPA, Florida Department of Environmental Protection (FDEP), and all applicable local regulations. Currently all underground tanks greater than 110 gallons and aboveground tanks greater than 550 gallons are regulated by FDEP. Installation of new tank systems and modifications of existing tank systems shall be reviewed and approved by the UF Tanks Coordinator in the EH&S office.
7. Provide monitoring of underground storage tanks.

8. Proper isolating/shut-off valves shall be provided.
9. Engine generator sets located on ground level, but with service access more than two feet above finished grade shall have a 'catwalk' of sufficient width and height for proper maintenance of the engine and generator.
10. Wiring for all generators shall have a separate compartment to connect wiring for testing or 'cam-lok' fittings installed at the cabling connections. Said 'cam-lok' fittings are required for installation of load bank testing equipment.

C. NATURAL GAS GENERATORS

1. Natural gas units shall include fuel strainers, and an electric shutoff valve.

D. GENERATOR EXHAUST EQUIPMENT

1. Generator exhaust shall be vented above the roof if possible. The exhaust system shall keep fumes away from the immediate area of the generator and from building fresh-air intakes.
2. The exhaust system shall include a condensation trap with drain.
3. Provide a rain cap and thimble, and vibration isolation, for through-the-roof penetration.
4. Mufflers shall be a minimum of Critical Grade. The muffler and piping design shall incorporate a drain valve for removing condensation.

1.2 AUTOMATIC TRANSFER SWITCHES

1. Automatic Transfer Switches (ATS) shall have the following capabilities: Adjustable time delays on starting (1-30 sec.), retransfer (1-30 min.), and shutdown or cool-down (1-30 min.); control switch with "test-off-auto" positions; indicator lights for "normal power-available", "normal power-connected", "emergency power-available", "emergency power-connected" and manual transfer override capability.
2. ATS shall provide positive means to prevent simultaneous connection of generator and main line (i.e. to prevent back-feeding).
3. A manual bypass switch shall be provided for repairs and emergencies. Closed transition switches and four pole transfers with a manual bypass feature shall be provided where generator testing adversely affects medical research or patient care operations.
4. On a case by case basis, closed transition automatic transfer switches may be allowed. Closed transition ATS's may be allowed, for instance, in areas where generator testing adversely affects research or patient care operations. If the switch is to be allowed, a professional engineer must address issues of combined fault currents in the design. Discussions of application must include UF/PPD personnel.
5. Automatic and manual 4 pole transfer switches are the preferred s type, particularly at the HSC to eliminate certain grounding and recirculating current problems.

6. ATS's shall have a real time meter installed in them.

a. The meter will show KW amps and voltages. It will also log date and time any transfers occurred.

b. The meter shall also store the peak demand kVA (maximum 15-minute demand) from the previous 30 days.

7. Acceptable Manufacturers: ASCO

1.3 **UNINTERRUPTIBLE POWER SOURCES**

- A. Capacity should be 30% above design load, with the ability to carry this capacity for a minimum of 3 hours.
- B. Batteries shall be of the sealed-cell type.
- C. A by-pass shall be installed, external to the unit, so that the entire unit can be isolated for maintenance or repair. All switching shall be done without detectable distortion of output waveform.
- D. The unit shall have a means of internal diagnostic checking.
- E. UPS shall provide positive means to prevent connection of inverter output with line (i.e. to prevent back-feeding).

1.4 **EMERGENCY GENERATORS**

- A. Emergency generators shall be equipped with radiators for all new installations.
- B. Where existing conditions limit the amount of available space for new generators with radiators, the design and installation may include the remote mounting of radiators.
- C. Where conditions require matching existing conditions for potable water-cooling the generator, new units should accommodate both potable water-cooling systems and (remote) radiator cooling. If existing conditions require potable water-cooling backup, design of the system will include appropriate piping and switching between the two.

END OF SECTION