



Washington State Patrol

Office of the State Fire Marshal

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NFPA 110 1999 Edition

Standard for Emergency & Standby Power Systems



Level 1 EPSS



- **2-2.4.1*** **Level 1** defines the most stringent equipment performance for applications where failure of the equipment to perform could result in loss of human life or serious injuries. All Level 1 equipment shall be permanently installed.

Level 1 EPSS

- **A-2.2.4.1** Typically, **Level 1** systems are intended to automatically supply illumination or power, or both, to critical areas and equipment in the event of failure of the primary supply or in the event of danger to elements of a system intended to supply, distribute, and control power and illumination essential for safety to human life.
- **Level 1** systems generally are installed in places of assembly where artificial illumination is required for safe exiting and for panic control in buildings subject to occupancy by large numbers of people.



Level 1 EPSS

- **A-2.2.4.1 (cont'd)**
- Emergency systems can also provide power for such functions as ventilation when essential to maintain life, fire detection and alarm systems, elevators, fire pumps, public safety communication systems, industrial processes where current interruption would produce serious life safety or health hazards, and similar functions. *(See NFPA 101©, Life Safety Code©, and Chapter 3, Electrical Systems, of NFPA 99, Standard for Health Care Facilities)*



Level 2 EPSS

- **2-2.4.2 Level 2** defines equipment performance requirements for applications where failure of the EPSS to perform is less critical to human life and safety and where it is expected that the authority having jurisdiction will exercise its option to allow a higher degree of flexibility than provided by Level 1. All level 2 equipment shall be permanently installed.



Class

- **2-2.3** Class defines the minimum time, in hours, for which the EPSS is designed to operate at its rated load without being refueled.

- ***Table 2-2.3 Classification of EPSSs***

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- Class 0.083 0.083 hours (5 minutes)
 - Class 0.25 0.25 hours (15 minutes)
 - Class 2 2 hours
 - Class 6 6 hours
 - Class 48 48 hours
 - Class X Other time in hours as required by the application, code, or user
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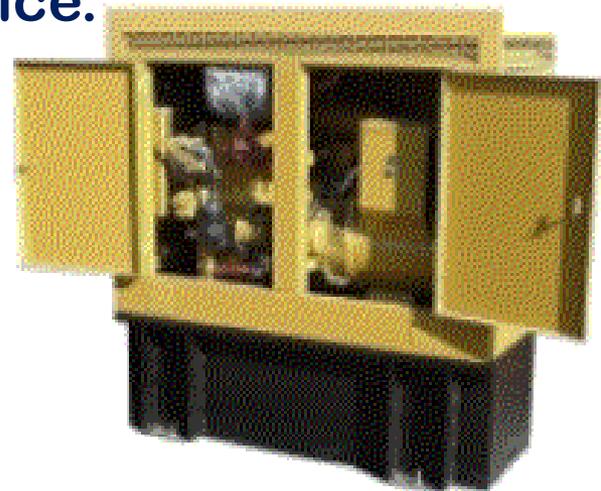


Routine Maintenance and Operational Testing

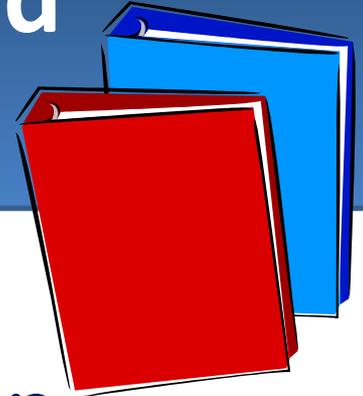


Routine Maintenance

- **6-1.1*** The routine maintenance and operational testing program shall be based on the manufacturer's recommendations, instruction manuals, and the minimum standards of this chapter and the authority having jurisdiction.
- **6-1.2** Consideration shall be given to temporarily providing a portable or alternative source whenever the emergency generator is out of service.



Manuals, Special Tools and Spare Parts



- **6-2.1** At least two sets of instruction manuals for all major components of the EPSS shall be supplied by the manufacturer(s) of the EPSS and shall contain the following:
 - (a) A detailed explanation of the operation of the system
 - (b) Instructions for routine maintenance
 - (c) Detailed instructions for the repair of the EPS and other major components of the EPSS
 - (d) An illustrated parts list and part numbers
 - (e) Illustrated and schematic drawings of electrical wiring systems, including operating and safety devices, control panels, instrumentation, and annunciators

Manuals Special Tools and Spare Parts (Continued)



- **6-2.2** For **Level 1** systems, one set of instruction manuals shall be kept in a secure location near the equipment. The other set shall be kept in a different secure location.
- **6-2.3** Special tools and testing devices required for routine maintenance shall be available for use when needed.
- **6-2.4** Replacement for parts identified by experience as high mortality items shall be maintained in a secure location(s) on the premises. Consideration shall be given to stocking spare parts as recommended by the manufacturer.



Maintenance and Operational Testing



- **6.3.1*** The EPSS shall be maintained to ensure to a reasonable degree that the system is capable of supplying serviced within the time specified for the type and for the time duration specified for the class.
- **6-3.2** A routine maintenance and operational testing program shall be initiated immediately after the EPSS has passed acceptance tests or after completion of repairs that impact the operational reliability of the system.



Records



- **6-3.3** A written schedule for routine maintenance and operational testing of the EPSS shall be established.
- **6-3.4** A written record of EPSS inspections, tests, exercising, operation, and repairs shall be maintained on the premises. The written record shall include the following:
 - (a) The date of the maintenance report
 - (b) Identification of servicing personnel
 - (c) Notation of any unsatisfactory condition and the corrective action taken, including parts replaced
 - (d) Testing of any repair for the appropriate time as recommended by the manufacturer

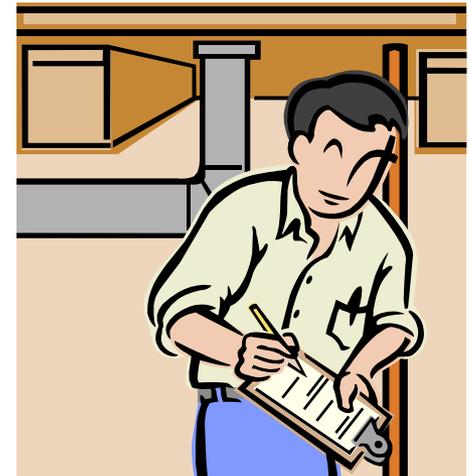
Transfer Switches and Batteries



- **6-3.5** Transfer switches shall be subjected to a maintenance program including connections, inspection or testing for evidence of overheating and excessive contact erosion, removal of dust and dirt, and replacement of contacts when required.
- **6-3.6*** Storage batteries, including electrolyte levels, used in connection with Level 1 and Level 2 systems shall be inspected at intervals of not more than 7 days and shall be maintained in full compliance with manufacturer's specifications. Defective batteries shall be repaired or replaced immediately upon discovery of defects.

Operational Inspection & Testing

- **6-4.1 Level 1 and Level 2** EPSSs, including all appurtenant components, shall be inspected weekly and shall be exercised under load at least monthly.
- **6-4.2** Generator sets in **Level 1 and Level 2** service shall be exercised at least monthly for a minimum of 30 minutes using one of the following methods:
 - (a) Under operating temperature conditions or at not less than 30 percent of the EPS nameplate rating.
 - (b) Loading that maintains the minimum exhaust gas temperatures as recommended by the manufacturer
- The date and time of day for required testing shall be decided by the owner, based on facility operations.



Operational Inspection & Testing



- **6-4.2.1** Equivalent loads used for testing shall be automatically replaced with emergency loads in case of failure of the primary source.
- **6-4.2.2** Diesel-powered EPS installations that do not meet the requirements of 6-4.2 shall be exercised monthly with the available EPSS load and exercised annually with supplemental loads at 25 % of nameplate rating for 30 minutes, followed by 50 % of nameplate rating for 30 minutes, followed by 75 % of nameplate rating for 60 minutes, for a total of 2 continuous hours.

Load Tests



6-4.3 Load tests of generator sets shall include complete cold starts.

6-4.4 Time delays shall be set as follows:

(a) Time delay on start: 1 second minimum

• *Exception: Gas turbine cycle: 0.5 second minimum*

(b) Time delay on transfer to emergency: no minimum

required

(c) Time delay on restoration to normal: 5 minutes

(d) Time delay on shutdown: 5 minutes minimum

Transfer Switch



6-4.5 Level 1 and Level 2 transfer switches shall be operated monthly. The monthly test of a transfer switch shall consist of electrically operating the transfer switch from the standard position to the alternate position and then return to the standard position.

- **6-4.6*** EPSS circuit breakers for **Level 1** system usage, including main and feed breakers between the EPS and the transfer switch load terminals, shall be exercised annually with the EPS in the off position.
 - Exception: Medium and high-voltage circuit breakers for **Level 1** system usage shall be exercised every six months and tested under simulated overload conditions every two years.

Oversight

- **6-4.7** The routine maintenance and operational testing program shall be overseen by a properly instructed individual.

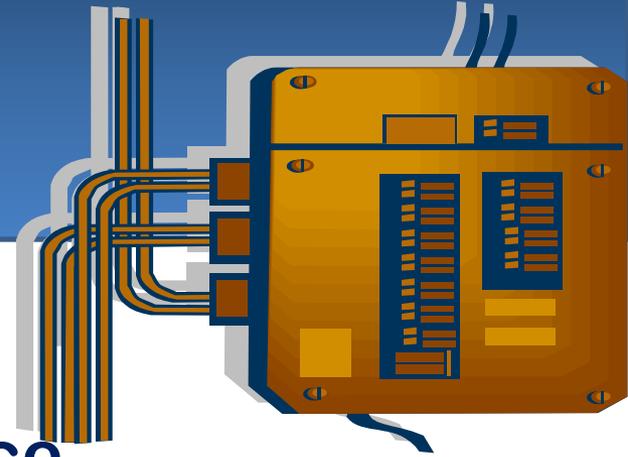


Operational Inspection & Testing



- **A-6-2** Where adequately secured from public access, it is desirable to locate instruction manual, special tools and testing devices, and spare parts in the room in which the emergency power supply is located. The articles should be mounted at a convenient location on a wall and should be enclosed in a metal or other suitable cabinet. The cabinet should accommodate the instruction manual on the inside of the door.

Maintenance



- **A-6-3.1** The suggested maintenance procedure and frequency should follow those recommended by the manufacturer. In the absence of such recommendations, the Figures A-6-3.1 (a) and (b) indicate alternate suggested procedures.
- **A- 6-3.6** Maintenance of batteries should include checking and recording the value of the specific gravity.
- **A- 6-4.6** Circuit breakers should be tested under simulated overload conditions every 2 years.

Questions and Answers

