

Emergency Generator Testing & Inspection Plan

Overview

This plan documents Monroe One BOCES commitment to provide reliable emergency power supply to the emergency lighting and exit lighting in the event of electrical power failure by detailing required inspections, testing and maintenance cycles for its emergency generator systems. This plan intends to encompass the requirements of the ICC building codes adopted by New York State which enforce the NFPA (National Fire Protection Association) Codes. Emergency lighting and exit lighting are considered life safety systems and the NFPA Code designates these as Level 1, Class 1.5 systems.

Emergency generators are operated by Monroe One BOCES in three locations, detailed in the table below. Power for these generators is provided by the Rochester Gas & Electric utility natural gas system. Each generator is part of a system which includes the transfer switch/switches and control, supervisory, and support devices, as well as the load terminals of the transfer equipment. Monroe One BOCES also operates standby generators to provide backup power to the servers in the Foreman Center (Building 1,2,3) and 11 Linden Park. These are not required to have an inspection and testing plan by code as they are not considered to be part of life safety systems.

Monroe One BOCES Emergency Generators Level 1, Class 1.5 Systems Life Safety Support for Emergency and Exit Lighting		
Location	Generator Manufacturer & Model	Connected Load
Foreman Center Bldg 1,2,3 Rm H-14A, 41 O'Connor Rd Fairport NY 14450	Kohler, Fast Response II 80 80 kW rating, 60 kW at 75% load Natural Gas Fuel	Emergency Lights Exit Lighting
Vocational Bldg 4,5,6 38 O'Connor Rd Fairport NY 14450	Onan, GGPC-6071233 45 kW, 120/240, Single phase	Emergency Lights Exit Lighting
Safety & Security Bldg 7 38 O'Connor Rd Fairport NY 14450	Generac, Model 0046650 9 (sold under Dayton name) 12 kW rating	Emergency Lights Exit Lighting
Bird-Morgan School Exterior, 108-120 East Ave East Rochester NY 14445	Caterpillar Olympian G100F1 100 kW standby, 90 kW prime	Emergency Lights Exit Lighting

Monroe One BOCES Standby Generators Support for vital business functions but not required by life-safety codes		
Location	Generator Manufacturer & Model	Connected Load
Foreman Center Bldg 1,2,3 Exterior South East Corner 41 O'Connor Rd Fairport NY 14450	Generac Power Systems, Inc. Natural Gas Fuel, 300 kW, Model 12953580200, Serial # 2112845, Hino engine EK130 S# A16649	Backup for servers in A-03, Auto transfer switch is in B-12
Technology Services, Outside I-01 Server Room 11 Linden Park Rochester NY 14625	Generac Power Systems, Inc. 130 rated kW, Purchased 12/2005 120/208 V, 3 ph, 451 Amps, 60 Hz Type SG0130-G366.8N28EPSYC Model 5513030100, Serial #2084180, Engine OD3454	Backup for servers in I-01
Technology Services, Outside I-01 Server Room 11 Linden Park Rochester NY 14625	Generac Power Systems, Inc. 130 rated kW, Purchased 12/2009 120/208 V, 3 ph, 451 Amps, 60 Hz Type SG0130-G366.8N30HPYYC Model 11209310200, Serial #11209310200, Engine OH0923	Backup for servers in I-01

GENERATOR TESTING AND INSPECTION REGULATIONS

Performance Requirement Summary for Emergency Generators:

Emergency generators used to provide power to emergency lighting and exit systems shall be installed, tested and maintained in accordance with NFPA 110, Emergency and Standby Power Systems. They must provide emergency illumination for not less than 90 minutes after the failure of normal lighting. And, emergency lighting must be not less than 1 foot-candle at any point along the path of egress at floor level. However, the lighting level may degrade to 0.6 foot-candle by the end of the 90 minute period.

Testing Requirements Summary for Emergency Generators:

1. Testing requirements follow from emergency lighting test requirements:
 - a. Monthly for a minimum of 30 seconds.
 - b. Annually for a minimum of 90 minutes.
2. Written records of tests shall be maintained by the building owner.
3. Testing standards do not establish a specific date and time of day for required testing. Tests may be scheduled to minimize disruption to supported operations.
4. Operational testing of the emergency generator, transfer switch and associated components must be overseen by a properly trained person. Evidence of such training should be kept in the designated employees' personnel file. In the absence of a properly trained person on-site, an outside vendor may be contracted to provide the testing.

Maintenance Requirements for Emergency Generators

Requirements for routine maintenance and operational testing of emergency generators can be found in Chapter 8 of the 2002 edition of NFPA 110 and Sections 3-4.4, 3-5.4 and 3-6.4 of NFPA 99(99).

1. Special tools and testing devices necessary for routine maintenance must be available for use when needed [see: NFPA 110(99), Section 6-2.3; NFPA 110(02), Sec. 8.2.3].
2. Routine maintenance and inspections of the emergency generator and associated components must be overseen by a properly trained person. Evidence of such training should be kept in the designated employees' personnel file. In the absence of a properly trained person on-site, an outside vendor may need to be contracted to oversee the performance of all or part of these services.

Weekly Inspections

Weekly inspection will be assigned and documented through the Q Ware CMMS, follow the equipment manufacture's recommendations and include a check of the following:

1. Natural gas line continuity: operating fuel pressure, piping integrity
2. Generator engine oil: proper level, operating pressure, oil heater if provided
 - a. Engine oil level may be checked with the unit stopped.
 - b. Oil operating pressure should normally be above 40 psi.
3. Cooling system: coolant level, water pump(s), jacket water heater, belts, hoses, fan
4. Exhaust system: drain condensate trap and inspect for possible leakage
5. Battery system: possible corrosion, specific gravity, electrolyte level (between 1250 and 1275) and battery charger operation
6. Electrical: a general inspection of wiring and connections, circuit breakers/fuses

7. Generator: debris, foreign objects, loose or broken fittings; guards and components; any unusual condition of vibration, leakage, noise, temperature or deterioration

Monthly Test Requirements

1. Monthly Tests will include a weekly inspection and require a completed Monthly Generator Exercise Report (attached to this plan) and will be assigned and documented through the Q Ware CMMS.
2. The completed Monthly Generator Exercise Report will be scanned to the shared drive S:\Workgroups\O & M-Staff\Health & Safety\Generator Testing and Inspections\Generator Inspection and Testing Logs
3. The Monthly Generator Exercise requires that proper PPE be worn for safety starting the generator and the transfer switch test.
4. The Monthly Generator Exercise requires that the generator be run not less than 35 minutes after achieving normal operating temperature at not less than 30% of its nameplate load.
5. The monthly test may be scheduled to coincide with a peak load shaving exercise, if not less than 20 or more than 40 days between tests.
6. The transfer switch must be tested and it should transfer power in not less than 1 second and not more than 10 seconds. "Transfer Test" switch or button may be used to perform this test.
7. The time delay on shutdown, or restoration to normal power is expected to be not less than 5 minutes, to give the primary source sufficient time to stabilize before retransfer of the load.

Annual Test Requirements

1. The annual test will replace and encompass all of the requirements of one monthly test its encompassed weekly inspection.
2. The annual test will be operate emergency generator system to prove that the emergency and exit lighting is consistently maintained for not less than 90 minutes.
3. Infrared test of each systems' transfer switch and load panels, to hunt for loose connections, will be scheduled to be performed annually.

Testing Cautions

1. Operating electrical breakers, especially high voltage and amperage breakers, exposes a person to possible shock, electrocution and/or arc flash hazards. Therefore, the person operating the switches or breakers must be adequately trained and take proper safety precautions, including the wearing of proper personal protective equipment (PPE).
2. The facility's electrical mains will not be used to test the emergency generator because there is risk that the unexpected might make it difficult or impossible to restore normal power. It is better to test by interrupting power just ahead of the transfer switch/switches on an alternating or rotating basis in order to make sure each transfer switch has an intact engine start circuit.

3. The test period is should be set for the health of the generator, for example the generator may not reach operating temperature in 30 minutes and may need a longer enough to ensure that all engine parts are properly lubricated and minimum exhaust gas temperatures as recommended by the manufacturer are achieved. The minimum testing parameters required by NFPA may not be long enough.

Emergency Generator Records

1. Emergency generator records must be available for review at the request of a code enforcement officer.
2. Inspections, tests, exercises, repairs, and maintenance reports and notes will be maintained for at least three years.
3. Generator maintenance records logs will be scanned into and located on the shared drive: S:\Workgroups\O & M-Staff\Health & Safety\Generator Testing and Inspections\Generator Maintenance Records.
4. The inspection and testing checklists will be scanned into and located on the shared drive: S:\Workgroups\O & M-Staff\Health & Safety\Generator Testing and Inspections\Generator Inspection and Testing Logs
5. The Q Ware CMMS (Computerized Maintenance Management System) is located online <http://quecentreweb.monroe.edu/monroe1boces/login.aspx> and contains the record of Preventative Maintenance Work Orders which detail the assignments of weekly, monthly and annual inspections and testing of the emergency generators.
6. The two employees who are responsible for knowing where these records are kept are the O&M Foreman, James Hartman and the O&M Office Manager, Darlene Keyes.
7. Records must include:
 - a. Date of report
 - b. Name(s) of the person(s) providing the service
 - c. Identification of unsatisfactory conditions
 - d. Corrective action taken (including parts replaced)
 - e. Any testing of repairs recommended by the manufacturer
8. Operation manuals for all major generator components must be kept in a secure, convenient location near the equipment.
9. A second operation manual will be kept on online, S:\Workgroups\O & M-Staff\Health & Safety\Generator Maintenance\Generator Operation Manuals
10. Operation manuals must, at a minimum, contain the following:
 - f. Explanation, in detail, of the operation of the emergency power supply system
 - g. Instructions for routine maintenance
 - h. Detailed repair instructions

- i. An illustrated parts list and part numbers
- j. Illustrated and schematic drawings of electrical wiring systems, including operating and safety devices, control panels, instrumentation and annunciators