

Fire Engineering®

Construction Concerns: Testing Exit and Emergency Lights Article and photos by Gregory Havel

April 25, 2011



Building and fire codes require the installation of light fixtures that will function during electric power failure (emergency lighting). These codes also require illuminated signs directing building occupants toward the building's exits (exit lights) and a secondary source of power in case of electric power failure. They will be checked by the building or fire inspector before an occupancy permit is issued in a new or remodeled building. The building

contractor will leave the maintenance and testing instructions from the exit and emergency lighting manufacturer with the owner, who often files them without reading them. Photo 1 shows a fixture that combines a self-illuminated exit sign and an emergency lighting fixture.

In buildings without backup electric power supplied by generators, exit and emergency lighting use batteries as their secondary power source. Each fixture is required to have a battery capable of operating the light or sign continuously for at least one and a half hours without failure. Each fixture is also required to have a battery charger.

Manufacturer's maintenance and testing instructions and the requirements in the fire codes are based on the requirements in the 2009 edition of National Fire Protection Association Standard 101, *Life Safety Code*, Articles 7.9.2.1 and 7.9.3.1.1 for emergency lighting. These articles include provisions for the use of self-testing/self-diagnostic battery power systems and computer-based self-testing/self-diagnostic systems. Article 7.10.4 states the requirements for self-illuminated exit signs with the same testing intervals.

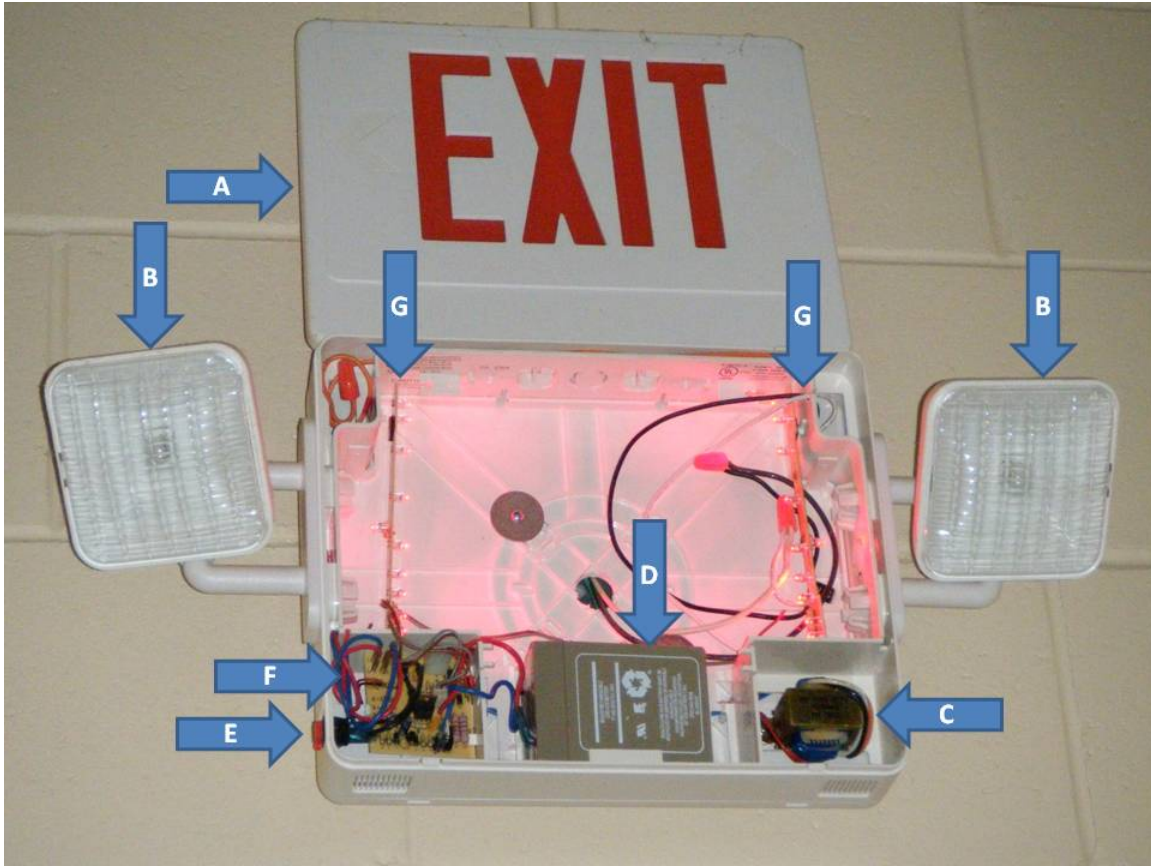


Photo 2 shows the fixture in photo 1, with the “Exit” sign removed from the front to expose its components:

- A is the “Exit” sign that has been removed from the front of the fixture.
- B is an emergency light.
- C is the electrical transformer that reduces the voltage of the building system to match the voltage used by the lights and battery charger.
- D is the rechargeable lead-acid gel-cell battery.
- E is the test button and LED function indicator.
- F is the battery charger and the circuit board that transfers the fixture to battery power when building system power fails
- G is an array of light-emitting diodes (LEDs) that illuminate the translucent “EXIT” sign

The required tests are simple and are in the 2009 edition of NFPA 1, *Fire Code*, Article 14.13.2.1.1 with a reference to the corresponding article in NFPA 101. Similar requirements are in the International Code Council’s *International Fire Code*, also with a reference to NFPA 101. A monthly functional test must be conducted at each fixture for not less than 30 seconds. An annual functional test must be conducted at each fixture for one and a half hours. These tests are required to ensure that the lights and backup batteries are working; and that they can provide power for one and a half hours if necessary. These tests must be documented for review by the Authority Having

Jurisdiction (AHJ). These tests can be conducted by building maintenance personnel or by a contractor if the owner chooses.

When a battery-powered emergency light or an exit sign fails a monthly or annual test, it is likely that the battery has failed. Although replacement batteries may be available through electrical contractors, electrical wholesalers, and manufacturers, most batteries are available more quickly and at less expense from retailers who specialize in batteries. The repairs can be made by qualified maintenance personnel, an electrician, or an emergency systems contractor. The replacement battery must be rated for the same voltage and at least as many ampere-hours as the original. It must be the same or smaller in size, since most emergency and exit sign fixtures have no extra room to accommodate larger batteries.

If the replacement battery does not put the fixture back in service, a qualified person or contractor will be needed to troubleshoot and make repairs or replace the fixture.

Gregory Havel is a member of the Town of Burlington (WI) Fire Department; a retired deputy chief and training officer; and a 30-year veteran of the fire service. He is a Wisconsin-certified fire instructor II and fire officer II, an adjunct instructor in fire service programs at Gateway Technical College, and safety director for Scherrer Construction Co., Inc. Havel has a bachelor's degree from St. Norbert College; has more than 30 years of experience in facilities management and building construction; and has presented classes at FDIC.

- [CLICK HERE](#) for more 'Construction Concerns' articles!