

Interpretation of the Electrical Safety Committee - March 2008  
Testing Class A GFCIs

**Summary**

NFPA 70E requires that Ground Fault Circuit Interrupter (GFCI) devices be tested per manufacturers' instructions. Further, Underwriters Laboratories, Inc. (UL) requires that manufacturers specify monthly testing in order to be listed per UL Standard 943. From BNL research into the origin of UL's requirement, it is the opinion of the LESC that the intent of the monthly testing instructions is to provide assurance that the GFCI device is operating properly. The LESC, as AHJ, stipulates that a "test-before-use" requirement will meet the intent of the manufacturer's instructions. The LESC understands that for locations where GFCIs are used infrequently, these devices will most likely not be tested monthly. Instead, provided that personnel are knowledgeable in the requirement to test the GFCI device prior to use, they will be as safe (if not safer) than if these devices were tested monthly by someone else.

The "test-before-use" requirement at BNL applies to all GFCI receptacles that are used intermittently, regardless of whether or not the Code requires a GFCI in that location. GFCI receptacles in continuous use and all GFCI circuit breakers will be tested per manufacturer's instructions. Specific requirements for the BNL GFCI testing program are presently contained in the Electrical Safety Subject Area within the Laboratory's Standards-Based Management System (SBMS). Appropriate labels will be applied to GFCI receptacles when specified by the Subject Area.

**Discussion**

GFCIs are designed to provide personnel protection against electrical ground-fault shocks. An operational GFCI will protect a user from a ground-fault through their body, which could otherwise result in injury or death. GFCIs are subject to wear and susceptible to damage from over-voltage due to lightning and from corrosion due to moisture. For these reasons, testing is required to verify that the GFCI will work and provide the desired protection when needed.

For permanently installed GFCI receptacle outlets and GFCI circuit breakers, UL recommends a monthly testing cycle, which is reflected in each manufacturer's instructions. For portable GFCIs, UL recommends that the units be tested before each use; again this recommendation is reflected in the manufacturer's instructions. In a product safety tip on the UL web site, the test procedure is described as "simple" and requires no special equipment.

The decision to implement a GFCI "test-before-use" program at BNL is based on the following conclusions drawn from an analysis conducted by members of the LESC and other BNL Subject-Matter Experts (SMEs). These conclusions are the basis for the opinion that a "test-before-use" program exceeds the intent of monthly testing recommendations.

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1. A GFCI testing plan should satisfy the intent of the Standards and Code by meeting or exceeding the provided level of safety to the worker.
2. The possibility of using a faulty GFCI device increases with the length of time since the last test.
3. Testing immediately prior to use provides a measure of safety greater than testing monthly and is consistent with the requirements for testing portable GFCI devices.
4. The electrical risk posed by using equipment plugged into a receptacle is proportional to use.
5. The GFCI testing plan should be made as simple as possible (consideration for human performance factors).

**Relevant Code Sections**

***NFPA 70 – Article 100 Definitions***

**Ground-Fault Circuit-Interrupter (GFCI).** A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device.

FPN: Class A ground-fault circuit-interrupters trip when the current to ground is 6mA or higher and do not trip when the current to ground is less than 4 mA. For further information, see UL 943, *Standard for Ground-Fault Circuit Interrupters*.

***NFPA 70, Article 110.3 - Examination, Identification, Installation, and Use of Equipment.***

**(B) Installation and Use.** Listed or labeled equipment shall be installed and used in accordance with any instructions included in the listing or labeling.

***NFPA 70E Article 110.9 – Use of Equipment***

**(C) GFCI Protection Devices.** GFCI protection devices shall be tested per manufacturer's instructions.