Consulting, Resource, Education, Training, and Support Services Home Inspectors
"A candle loses no light when it lights another candle."

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NEW INDUSTRY STANDARDS AND CODE REQUIREMENTS FOR GFCI AND AFCI DEVICES

Behind the construction of every home and the products and equipment that go into it are multiple organizations which either contribute to or enforce various standards and regulations pertaining to residential building components, materials, and products or regulate their application and installation.

It is important to understand the difference between consensus standards, product compliance standards, and building code requirements. Ideally, they work hand in hand. Consensus standards and product compliance standards regulate the manufacturers who want the approval of such organizations for their products. Building codes regulate the installation of such products.

- There are organizations that formulate and promulgate various building codes such as the International Code Council (ICC) and the National Fire Protection Association (NFPA), the organization which produces the National Electrical Code (NEC).
- There are consensus standards organizations such as the American National Standards Institute (ANSI) and the Canadian Standards Association (CSA) which formulate and regulate standards regarding different products and devices.
- There are product compliance organizations which test, evaluate, and approve or disapprove various types of products, equipment, and devices such as the Underwriters Laboratories, Inc. (UL).
- Finally, there are both governmental and private sector organizations such as the United States Consumer Product Safety Commission (CPSC) and the Electrical Safety Foundation International (ESFI) whose goals are to reduce injuries and deaths from unsafe products and conditions.

All of these organizations review and change their requirements and recommendations on an ongoing basis. Building codes are modified and revised annually and different state, county, and municipal jurisdictional building departments also adopt changes in building codes, typically on a three year code change cycle basis. Therefore, while home inspectors are neither "code compliance" nor "life/safety requirement" inspectors, it is still important for home inspectors to be familiar with both certain code requirements and code changes as well as with building industry product standards and changes in order both to better understand the rationale behind them and to reduce the potential for providing incorrect or inaccurate information to customers and to construction professionals.

This article provides ***ProSpex*** subscribers with information pertaining to new standards and requirements for ground fault circuit interrupter (GFCI) receptacle outlets and for arc fault circuit interrupter (AFCI) devices.

An article in the May-June issue of the "*IAEI News*" discusses new GFCI receptacle outlets requirements which are the result of collaboration between ESFI, CSA, UL, the National Electrical Manufactures Association (NEMA), and the United States Consumer Product Safety Commission (CPSC). According to the article, "The new requirements are being set by CSA and UL and apply to the harmonized standards, UL 943, *Safety Standards for Ground-Fault Circuit Interrupters* (GFCIs) and CSA C22.2 No. 144.4, *Ground-Fault Circuit Interrupters*."

Article 100 of the NEC defines a ground-fault interrupter as: "*A device intended for the protection of personnel that functions to de-energize a circuit or a portion thereof within an established period of time when a current to ground exceeds the values established for a class A device*." There is a Fine Print Note which immediately follows this definition that provides additional information regarding what constitutes a class A GFCI device. This note states that a "*class A GFCI trips when the current to ground has a value in the range of 4 milliamps to 6 milliamps*."

The new standards for GFCI devices include what both what an "*end of life provision*" and a "*reverse line-load miswire*" requirement.

The "*End of Life Provision*" is as follows: When a GFCI receptacle outlet is incapable of passing its internal test function (it can no longer provide ground-fault protection), it will either a) render itself incapable of delivering power, or it will b) indicate by visual or audible means that the device must be replaced.

The "*Reverse Line-Load Miswire*" requirement is as follows: If a GFCI device is miswired, it will deny power to the receptacle outlet face as well as to downstream receptacle outlets.

These revisions to UL 943 GFCI Standard are scheduled to take effect in the USA on July 28, 2006. As of and after that date, all manufacturers of GFCI devices, including GFCI receptacle outlets must begin producing GFCI receptacle outlets which meet the new standards. When a line-load reversal condition existed at a GFCI receptacle outlet manufactured prior to July 28, 2006 and distributed in the USA, power was still provided to the outlet (it was still "hot") but the receptacle outlet was <u>not</u> GFCI protected. In the USA, distributors of GFCI receptacle outlets can sell and contractors can install old style GFCI receptacle outlets manufactured before July 28, 2006 which do not meet the new standards requirements until their supplies run out.

In Canada, the selection of the effective date involves a process that has not yet been completed. Once this occurs, the effective date will be included in the Certification Notice announcing the 2006 edition of CSA Standard C22.2 No. 144.1. The CSA revisions will not affect the CEC, which regulates installations, not products.

For additional information regarding GFCIs as well as the new UL and CSA requirements, contact ESFI at: (703) 841-3229 or got their website at www.esfi.org.

Leviton SmartLockPROTM© GFCI Receptacle Outlet

Photo Courtesy Leviton

New 2005 NEC Requirements for the Location of GFCI Devices in Dwelling Units

Section 210.8(A) of the NEC covers GFCI protection for personnel with regard to 125 V, single phase, 15 ampere and 20 ampere receptacle outlets in specific locations in dwelling units. Prior to 2005, Section 210.8(A)(7) of the NEC covered GFCI protection for 125 V, single phase, 15 ampere and 20 ampere receptacle outlets serving wet bar countertops and located within six (6) feet of a wet bar countertop. This has been revised for the 2005 NEC. This subsection has been expanded to include 125 V, single phase, 15 ampere and 20 ampere receptacle outlets within six (6) feet of dwelling unit laundry sinks, utility sinks, and wet bar sinks at any height. Because this section now covers not only wet bar sinks but also laundry sinks and utility sinks, the old reference to countertops has been deleted. The new requirement applies to receptacle outlets located from the floor level up to six (6) feet above such sinks, including receptacle outlets mounted in the ceiling but still located within the six-foot dimension from the edge of a laundry sink, utility sink, or wet bar sink.

Section 210.8(B)(5) of the 2005 NEC requires GFCI protection for all 125 V, single phase, 15 ampere and 20 ampere receptacle outlets installed at an accessible location either inside or outside a building and intended for the servicing of heating, air-conditioning, and refrigeration equipment in accordance with Section 210.63 (this section covers heating, air-conditioning, and refrigeration equipment outlets).

Requirements for the Location of AFCI Devices in Dwelling Units

The 2008 NEC expanded the current requirement that mandates AFCI protection for all 125 V, single phase, 15 ampere and 20 ampere branch circuit receptacle outlets that supply bedrooms in dwelling units to include all 125 V, single phase, 15 ampere and 20 ampere receptacle outlets throughout dwelling units.

The rationale behind this expansion of the current AFCI location requirements is based on the proven effectiveness of AFCI devices in detecting and clearing arcing conditions or events before damage and loss occur which, in turn, reduces the potential for electrical fires in dwellings.

AFCI Circuit Breakers

Photo Courtesy of Square D

Photo Courtesy of Siemens

NOTE: All receptacle outlets protected by an upstream GFCI device or an AFCI device are to be labeled or otherwise identified as so protected on the receptacle outlet cover plate.

For more information on electrical systems and components, go to: www.iaei.org, www.mikeholt.com, and www.electrical-contractor.net.