

AFCI receptacles have arrived

Options for AFCI type receptacles grow

Requirements for residential arc-fault circuit-interrupters (AFCIs) were first mandated in the 1999 National Electrical Code (NEC) and their application has been expanded in every code cycle since.

Until recently, installers have had to rely on circuit breaker type AFCI devices to address these requirements. While AFCI circuit breakers met the intent of the NEC requirement, there are many installations where receptacle type AFCI devices are not only preferable, yet also more economical.

The actual operation of an AFCI is sometimes misunderstood. Unlike ground-fault circuit-interrupters (GFCIs) that provide fatal electrical shock protection to people by detecting leakage current and quickly disconnecting power, AFCIs protect structures from fires and related hazards by detecting arcing and quickly interrupting the power in the circuit.

There are two types of arc faults that AFCI devices detect: series and parallel. A series arc occurs when a break in a single conductor or termination causes electricity to jump across the gap and creates an arc. Parallel arcs also occur due to a break, yet electrically jump between line, neutral or ground. Technology in the new AFCI receptacles addresses the dangers associated with both series and parallel arcing. Similar to GFCI devices, AFCI receptacles provide feed-through protection and are able to detect downstream arc-faults, both parallel and series, as well as upstream

series arc faults.

In the 2011 NEC, Article 210.12(A) allows the use of AFCI receptacles with certain limitations. The outlet branch-circuit (OBC) AFCI receptacle must be installed as the first receptacle of the branch circuit, and the conductors between the branch circuit overcurrent device and the first outlet must be installed using metal boxes with one of the following wiring methods: rigid metal conduit (RMC), intermediate metal conduit (IMC), electrical metallic tubing (EMT), metal-clad cable (MC) or steel armored cable (AC). In addition, NEC Article 210.12(B) addresses branch circuit wiring that is modified, replaced or extended, stating that the circuit must be protected by either a listed combination-type AFCI located at the origin of the branch circuit, or a listed OBC type AFCI located at the first receptacle outlet of the existing branch circuit.

Effective Jan. 1, 2014, NEC Article 406.4 will require that where a receptacle outlet is supplied by a branch circuit that requires AFCI protection according to 210.12(A), a replacement receptacle at this outlet may be one of the following:

- a listed OBC type AFCI receptacle,
- a receptacle protected by an upstream listed OBC type AFCI receptacle, or
- a receptacle protected by a combination (series/parallel) type AFCI circuit breaker.

Early proposals for the 2014 NEC suggest an expansion of the AFCI

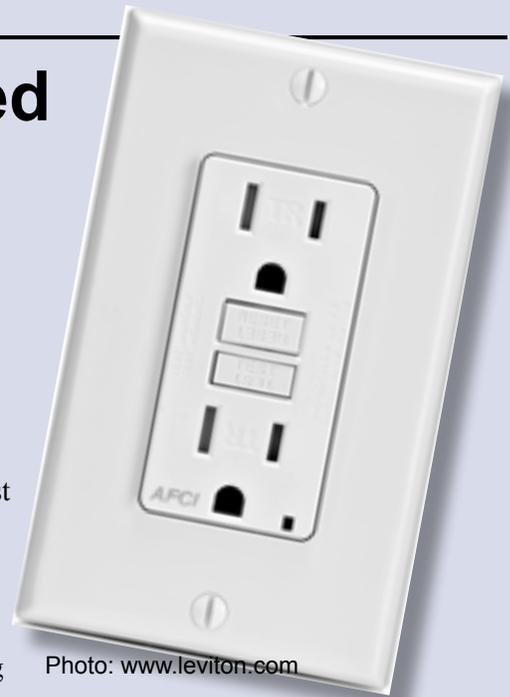


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branch circuit protection requirements to include the kitchen and laundry areas of a dwelling. In addition, changes will allow AFCI receptacles to be installed with standard nonmetallic-sheathed (NM) type cable to protect the entire branch circuit in any of the areas specified in Article 210.12 (A) with the following caveats:

- AFCI receptacles must be installed as the first outlet on the branch circuit,
- that first AFCI receptacle must be within 70 feet of the overcurrent protection device for 12 gauge conductors and within 50 feet of the 14 gauge conductors, and
- AFCI receptacles must be listed for compatibility with specific magnetic circuit breakers commonly found on the market today or used downstream from a new type of breaker called a supplemental arc protection (SAP) breaker that enhances the parallel arc protection close to the overcurrent device.

Complying with these new requirements effectively protects the entire branch circuit from series and parallel arcs and helps to mitigate deadly and costly structure fires.