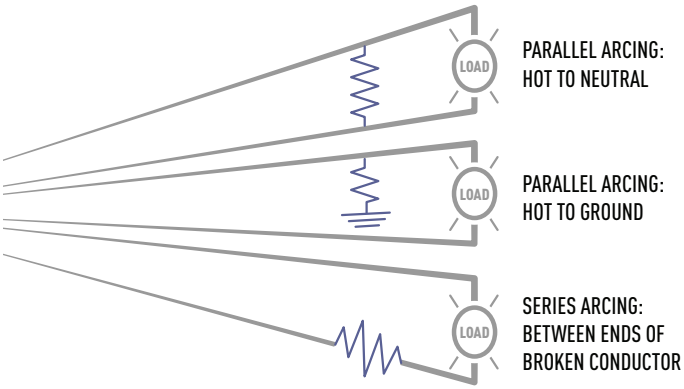
AFCI RECEPTACLE FAQs

1 What is an arc fault?

UL® provides a definition for an arc fault in UL 1699 (Standard for Safety Arc Fault Circuit Interrupters). It is an unintentional arcing condition in a circuit. Arcing creates high-intensity heating that can ignite surrounding material such as wood framing or insulation.



2 What causes arc faults?

Arcing can occur when electrical wires are damaged or worn. For instance:

- Insulation in cables can be severed if a staple is misapplied.
- A drill bit or nail can sever the insulation of cable inside a wall.
- Furniture pushed against the plug of an appliance cord can stress conductors and damage insulation.
- Inappropriate use of extension cords. Placement of extension cords under rugs or in a door jamb can result in damaged conductors.
- Wear and tear of appliance power cords can eventually lead to damaged conductors.
- Loose wire terminations.





3 What is an Arc Fault Circuit Interrupter (AFCI)?

An Arc Fault Circuit Interrupter (AFCI) protects against electrical fires. UL defines an AFCI as a device intended to mitigate the effects of arcing faults by functioning to de-energize the circuit when an arc fault is detected.

4 What types of AFCIs are available?

There are multiple types of AFCI available on the market:

OUTLET BRANCH-CIRCUIT AFCI OR AFCI RECEPTACLE—UL defines this as a device intended to be installed as the first outlet in a branch circuit. It is intended to provide protection to downstream branch-circuit wiring, cord sets, and power-supply cords against the unwanted effects of arcing. This device also provides protection to upstream branch-circuit wiring. It is intended to be provided with or without receptacle outlets.

COMBINATION AFCI OR COMBINATION AFCI CIRCUIT BREAKER— An AFCI which complies with the requirements of both branch/feeder and outlet circuit AFCIs. It is intended to protect downstream branch-circuit wiring and cord sets and power supply cords.

NOTE: Some of these AFCI's are available as Dual-Function AFCI/GFCI devices.

Legrand offers a Pass & Seymour® Outlet Branch-Circuit AFCI and AFCI/GFCI Receptacles.

5 What requirements are in the National Electrical Code® (NEC®) for AFCI and AFCI/GFCI Receptacles?

The following describes the means of providing arc-fault protection with an Outlet Branch-Circuit AFCI Receptacle. Please refer to the NEC for more information on other methods of AFCI protection.

Section 210.12 of the 2014 NEC requires arc-fault circuit interrupter protection in dwelling units, dormitory units and on dwelling unit branch circuits that are extended or modified. The arc-fault circuit interrupter shall be installed in a readily accessible location.

DWELLING UNITS — All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling unit kitchens, family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter.

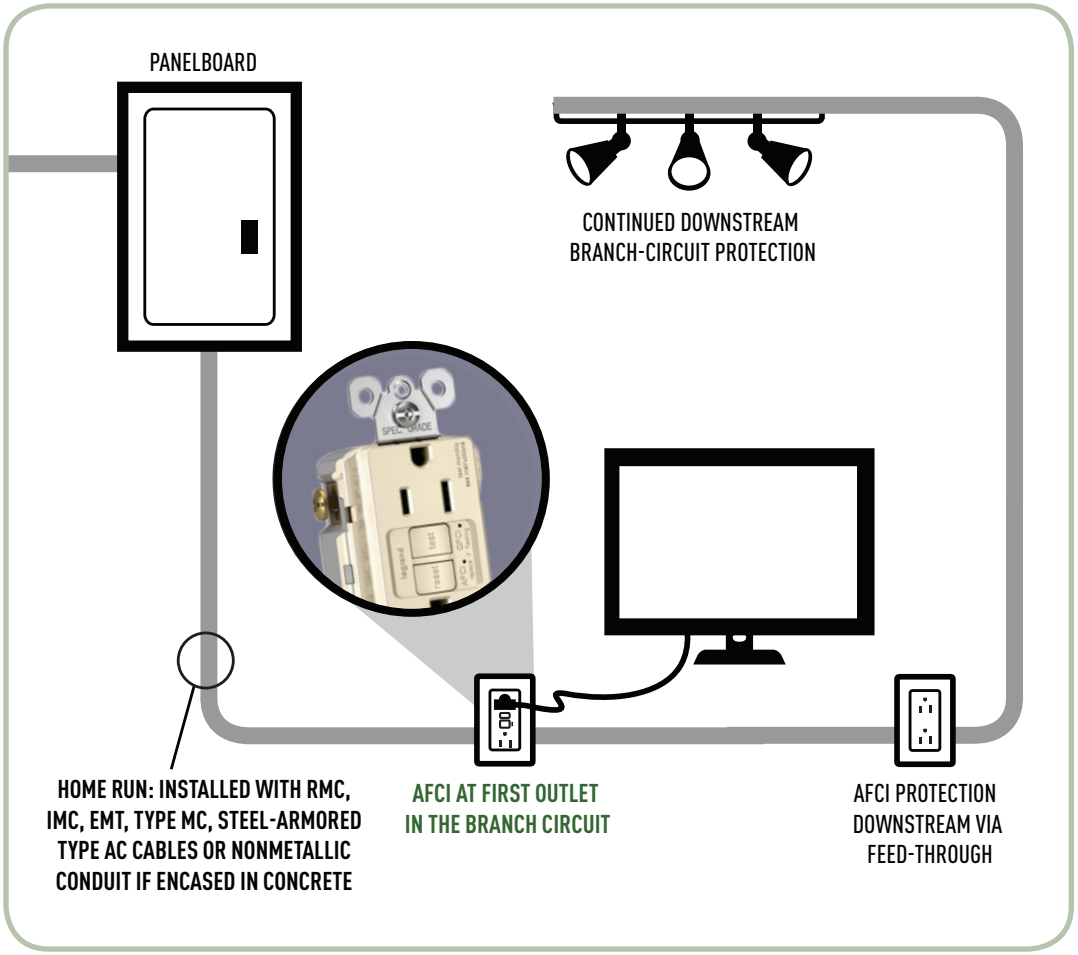
DORMITORY UNITS — All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets installed in dormitory unit bedrooms, living rooms, hallways, closets, and similar rooms shall be protected by a listed arc-fault circuit interrupter.

Note: Guest Rooms and Guest Suites — Guest rooms and guest suites that are provided with permanent provisions for cooking shall have branch circuits installed to meet the rules for dwelling units (including AFCI protection).

■ It is permissible to meet this requirement if **RMC, IMC, EMT conduit, Type MC or steel-armored Type AC cables and metallic boxes are installed for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet,** and an Outlet Branch-Circuit type AFCI is installed at the first outlet to provide protection for the remaining portion of the branch circuit (see Figure 1).

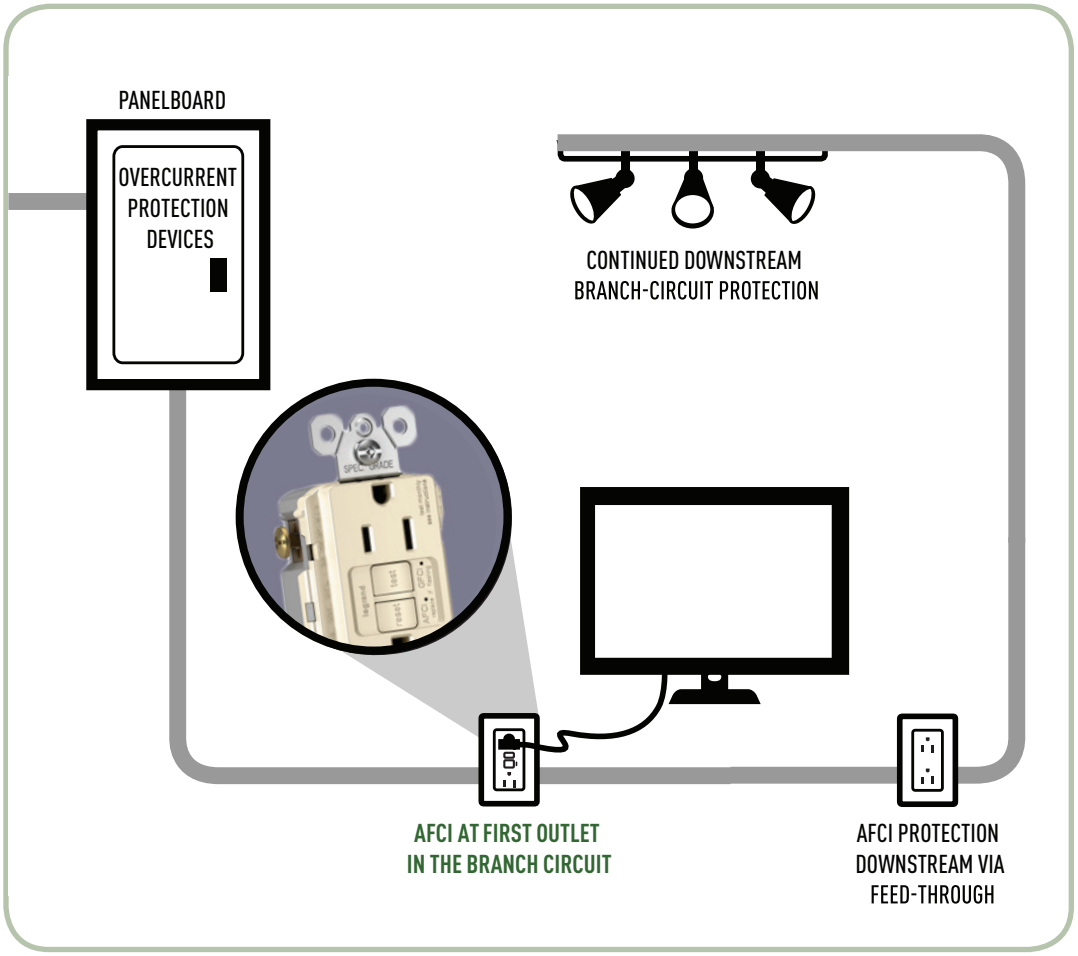
■ It is also permissible to meet this requirement if a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 2 in. of concrete for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, and an Outlet Branch-Circuit AFCI Receptacle is installed at the first outlet to provide protection for the remaining portion of the branch circuit (see Figure 1).

Figure 1



BRANCH-CIRCUIT EXTENSIONS OR MODIFICATIONS — DWELLING UNITS — When branch-circuit wiring is modified, replaced or extended it is permissible to meet the NEC requirement with a listed outlet branch-circuit AFCI receptacle located at the first receptacle outlet of the existing branch circuit (see Figure 2):

Figure 2



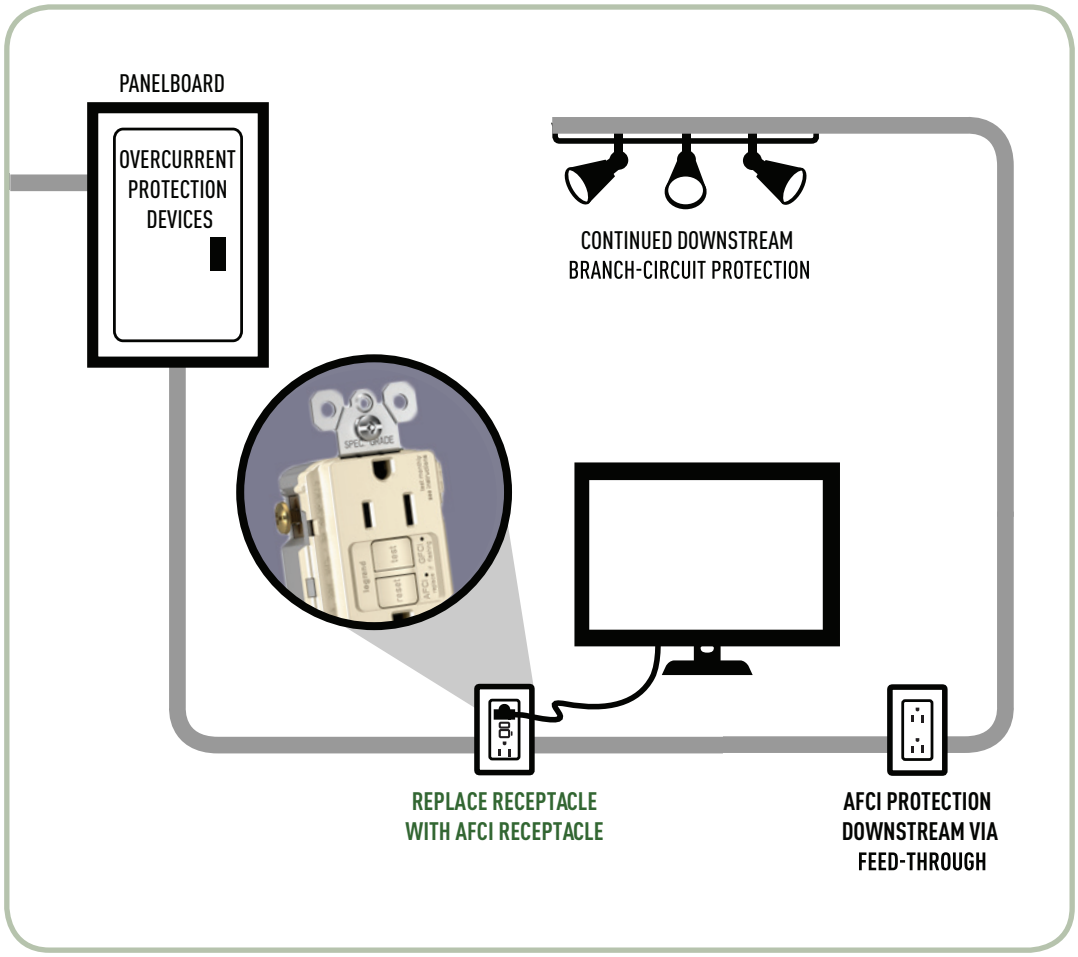
Section 406.4 (D)(4) requires AFCI protection when a receptacle is replaced.

REPLACEMENTS — Where a receptacle outlet is supplied by a branch circuit that requires AFCI protection, a replacement receptacle shall be one of the following (see Figure 3):

1. A listed Outlet Branch-Circuit type AFCI Receptacle

2. A receptacle protected by a listed Outlet Branch-Circuit type AFCI Receptacle

Figure 3



6 What are some of the benefits to using an AFCI Receptacle instead of an AFCI breaker?

AFCI Receptacles provide a much more convenient way of protecting a house. Like a GFCI Receptacle, an AFCI Receptacle is located in the living space, therefore TEST and RESET are controlled locally and the indicator light can be easily seen. No confusing trips to the breaker box are required.

Less confusion for the homeowner means fewer call-backs for the electrical contractor.

AFCI Receptacles are easier to install.

AFCI Breakers can only be installed in a breaker box of the same brand. AFCI Receptacles will fit in any wall box. This reduces contractor inventory and ordering complexity.

An AFCI Receptacle can be installed in a wall box as a cost-effective alternative when there is insufficient space in a breaker box or there is no matching AFCI Receptacle for a brand of breaker box.

An AFCI Receptacle can be installed on a circuit with shared neutrals on the line side.

7 What is the difference between an AFCI and a GFCI?

Ground Fault Circuit Interrupters (GFCI) protect people from serious injury due to electrical shock. Arc Fault Circuit Interrupters (AFCI) protect against electrical fires.

8 Can an AFCI and a GFCI be used on the same circuit?

Yes, an AFCI can be used on the same circuit as a GFCI.

9 When is a Dual Function AFCI/GFCI Receptacle required?

The 2014 & 2017 NEC requires both AFCI and GFCI protection on circuits supplying kitchens and laundry rooms. A convenient way of meeting this requirement is with a Dual Function AFCI/GFCI Receptacle.

10 Can an AFCI and/or an AFCI/GFCI Receptacle be used on a circuit with a shared neutral?

Yes, an AFCI and/or AFCI/GFCI Receptacle can be used on a circuit with shared neutrals on the line side. This makes the Receptacle an excellent solution for remodel and replacement projects where shared neutrals are often present.

The sources for the article are:

- 2011 National Electrical Code
- 2014 National Electrical Code
- 2017 National Electrical Code
- UL 1699 Standard for Safety Arc-Fault Circuit Interrupters
- NEMA

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