

# NEC2011 中涉及 AFCI 的条款

## ARTICLE 100

### Definitions

#### I. General

**Arc-Fault Circuit Interrupter (AFCI).** A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.

#### **210.12 Arc-Fault Circuit-Interrupter Protection.**

(A) Dwelling Units. All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets [installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas](#) shall be protected by a listed arc-fault circuit interrupter, [combination-type](#), installed to provide protection of the branch circuit.

Informational Note No. 1: For information on types of arc-fault circuit interrupters, see [UL 1699-1999](#), Standard for Arc-Fault Circuit Interrupters.

Informational Note No. 2: See 11.6.3(5) of NFPA 72-2010, National Fire Alarm and Signaling Code, for information related to secondary power supply requirements for smoke alarms installed in dwelling units.

Informational Note No. 3: See 760.41(B) and 760.121(B) for power-supply requirements for fire alarm systems.

**Exception No. 1:** If RMC, IMC, EMT, Type MC, or steel [armored](#) Type AC cables meeting the requirements of 250.118 and [metal outlet and junction boxes](#) are installed for the portion of the branch circuit [between the branch-circuit over current device and the first outlet](#), it shall be permitted to install an [outlet branch-circuit type AFCI](#) at the first outlet to provide protection for the remaining portion of the branch circuit.

**Exception No. 2:** Where a listed metal or nonmetallic conduit or tubing is [encased in not less than 50 mm \(2 in.\) of concrete](#) for the portion of the branch circuit between the branch-circuit over current device and the first outlet, it shall be permitted to install an [outlet branch-circuit type AFCI](#) at the first outlet to provide protection for the remaining portion of the branch circuit.

**Exception No. 3:** Where an individual branch circuit to a fire alarm system installed in accordance with 760.41(B) or 760.121(B) is installed in RMC, IMC, EMT, or [steel sheathed](#) cable, Type AC or Type MC, meeting the requirements of 250.118, with [metal outlet and junction boxes](#), AFCI protection [shall be permitted to be omitted](#).

**(B) Branch Circuit Extensions or Modifications** — Dwelling Units. In any of the areas specified in 210.12(A), where branch-circuit wiring is [modified, replaced, or extended](#), the branch circuit shall be protected by one of the following:

- (1) A listed [combination-type AFCI](#) located at the origin of the branch circuit
- (2) A listed [outlet branch-circuit type AFCI](#) located at the first receptacle outlet of the existing

branch circuit

#### **406.4 General Installation Requirements.**

(D) Replacements. Replacement of receptacles shall comply with 406.4(D)(1) through (D)(6), as applicable.

(4) **Arc-Fault Circuit-Interrupter Protection.** Where a receptacle outlet is supplied by a branch circuit that requires arc-fault circuit interrupter protection as specified elsewhere in this Code, a **replacement receptacle** at this outlet shall be one of the following:

- (1) A listed **outlet branch circuit type arc-fault circuit interrupter receptacle**
- (2) A receptacle protected by a listed **outlet branch circuit type arc-fault circuit interrupter type receptacle**
- (3) A receptacle protected by a listed **combination type arc-fault circuit interrupter type circuit breaker**

**This requirement becomes effective January 1, 2014.**

#### **440.65 Leakage-Current Detector-Interrupter (LCDI) and Arc-Fault Circuit Interrupter (AFCI).**

Single-phase **cord-and-plug-connected room air conditioners** shall be provided with **factory-installed LCDI or AFCI protection**. The LCDI or AFCI protection shall be **an integral part** of the attachment **plug or** be located **in the power supply cord** within 300 mm (12 in.) of the attachment plug.

#### **550.25 Arc-Fault Circuit-Interrupter Protection**

(A) Definition. Arc-fault circuit interrupters are defined in Article 100.

(B) **Mobile Homes** and **Manufactured Homes**. All 120-volt branch circuits that supply 15- and 20-ampere outlets installed in family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hall-ways, or similar rooms or areas of mobile homes and manufactured homes shall **comply with 210.12**.

## **II. Circuit Requirements**

### **690.7 Maximum Voltage**

(E) Bipolar Source and Output Circuits.

For 2-wire circuits connected to bipolar systems, the maximum system voltage shall be the highest voltage between the conductors of the 2-wire circuit if all of the following conditions apply:

(1) One conductor of each circuit of a bipolar subarray is solidly grounded.

Exception: The operation of ground-fault or **arc-fault devices** (abnormal operation) shall be permitted to interrupt this connection to ground when the entire bipolar array becomes two distinct arrays isolated from each other and the utilization equipment.

(2) Each circuit is connected to a separate subarray.

(3) The equipment is clearly marked with a label as follows:

WARNING  
BIPOLAR PHOTOVOLTAIC ARRAY.  
DISCONNECTION OF NEUTRAL  
OR GROUNDED CONDUCTORS

MAY RESULT IN OVERVOLTAGE  
ON ARRAY OR INVERTER.

**690.11 Arc-Fault Circuit Protection (Direct Current).**

Photovoltaic systems with dc source circuits, dc output circuits, or both, on or penetrating a building operating at a PV system maximum system voltage of 80 volts or greater, shall be protected by a listed (dc) arc-fault circuit interrupter, PV type, or other system components listed to provide equivalent protection. The PV arc-fault protection means shall comply with the following requirements:

- (1) The system shall detect and interrupt arcing faults resulting from a failure in the intended continuity of a conductor, connection, module, or other system component in the dc PV source and output circuits.
- (2) The system shall disable or disconnect one of the following:
  - a. Inverters or charge controllers connected to the fault circuit when the fault is detected
  - b. System components within the arcing circuit
- (3) The system shall require that the disabled or disconnected equipment be manually restarted.
- (4) The system shall have an annunciator that provides a visual indication that the circuit interrupter has operated. This indication shall not reset automatically.

**III. Disconnecting Means**

**690.13 All Conductors.** Means shall be provided to disconnect all current-carrying dc conductors of a photovoltaic system from all other conductors in a building or other structure. A switch, circuit breaker, or other device shall not be installed in a grounded conductor if operation of that switch, circuit breaker, or other device leaves the marked, grounded conductor in an ungrounded and energized state.

Exception No. 1: A switch or circuit breaker that is part of a ground-fault detection system required by 690.5, or that is part of an arc-fault detection/interruption system required by 690.11, shall be permitted to open the grounded conductor when that switch or circuit breaker is automatically opened as a normal function of the device in responding to ground faults.

Exception No. 2: A disconnecting switch shall be permitted in a grounded conductor if all of the following conditions are met:

- (1) The switch is used only for PV array maintenance.
- (2) The switch is accessible only by qualified persons.
- (3) The switch is rated for the maximum dc voltage and current that could be present during any operation, including ground-fault conditions.

Informational Note: The grounded conductor may have a bolted or terminal disconnecting means to allow maintenance or troubleshooting by qualified personnel.

**II. Non-Power-Limited Fire Alarm (NPLFA) Circuits**

**760.41 NPLFA Circuit Power Source Requirements.**

(B) Branch Circuit. The branch circuit supplying the fire alarm equipment(s) shall supply no other loads. The location of the branch-circuit overcurrent protective device shall be permanently identified at the fire alarm control unit. The circuit disconnecting means shall have red identification, shall be accessible only to qualified personnel, and shall be identified as "FIRE

ALARM CIRCUIT.” The red identification shall not damage the overcurrent protective devices or obscure the manufacturer’s markings. This branch circuit shall not be supplied through ground-fault circuit interrupters or arc-fault circuit-interrupters.

Informational Note: See 210.8(A)(5), Exception, for receptacles in dwelling-unit unfinished basements that supply power for fire alarm systems.

### **III. Power-Limited Fire Alarm (PLFA) Circuits**

#### **760.121 Power Sources for PLFA Circuits**

(B) Branch Circuit. The branch circuit supplying the fire alarm equipment(s) shall supply no other loads. The location of the branch-circuit overcurrent protective device shall be permanently identified at the fire alarm control unit. The circuit disconnecting means shall have red identification, shall be accessible only to qualified personnel, and shall be identified as “FIRE ALARM CIRCUIT.” The red identification shall not damage the overcurrent protective devices or obscure the manufacturer’s markings. This branch circuit shall not be supplied through ground-fault circuit interrupters or arc-fault circuit interrupters.