

ARTICLE 404

SWITCHES

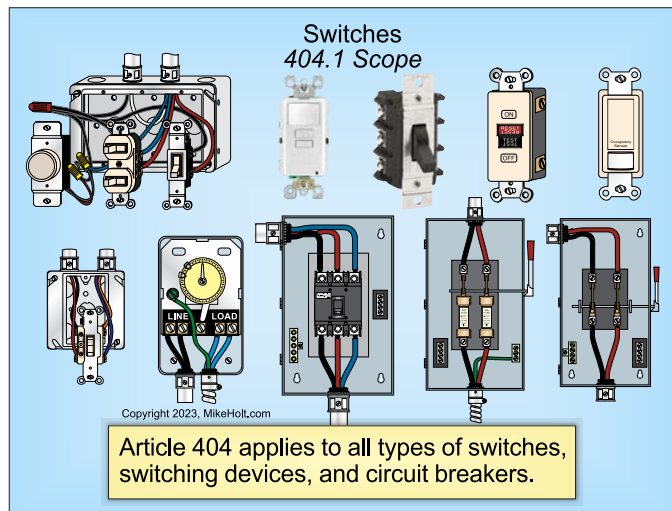
Introduction to Article 404—Switches

Article 404 covers all types of switches, switching devices, and circuit breakers such as snap (toggle) switches, dimmer switches, fan switches, disconnect switches, circuit breakers, and automatic switches such as those used for time clocks and timers. Topics covered in this material for Article 404 include:

- ▶ Scope
- ▶ General-Use Snap Switches, Dimmers, and Control Switches
- ▶ Bonding Enclosures

404.1 Scope

The requirements of Article 404 apply to all types of switches, switching devices, and circuit breakers. ▶Figure 404-1



▶Figure 404-1

Article 404 does not cover wireless control equipment to which circuit conductors are not connected. ▶Figure 404-2



▶Figure 404-2

Note: See 210.70 for additional information related to branch circuits that include switches or listed wall-mounted control devices.

404.9 General-Use Snap Switches, Dimmers, and Control Switches

(A) Faceplates. Faceplates for switches, dimmers, and control switches must completely cover the outlet box opening. Where flush mounted, the faceplate must seat against the wall surface. ▶Figure 404-3

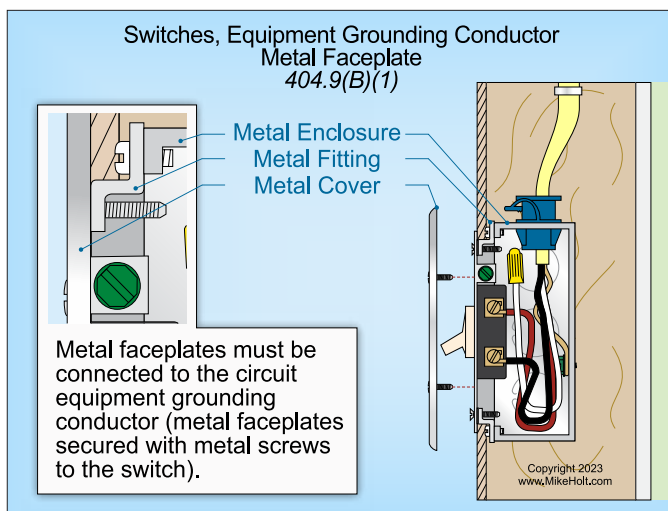


▶Figure 404-3

(B) Equipment Grounding Conductor. Switches, dimmers, and control switches and metal faceplates must be connected to the circuit equipment grounding conductor using either of the following methods:

(1) Metal Boxes.

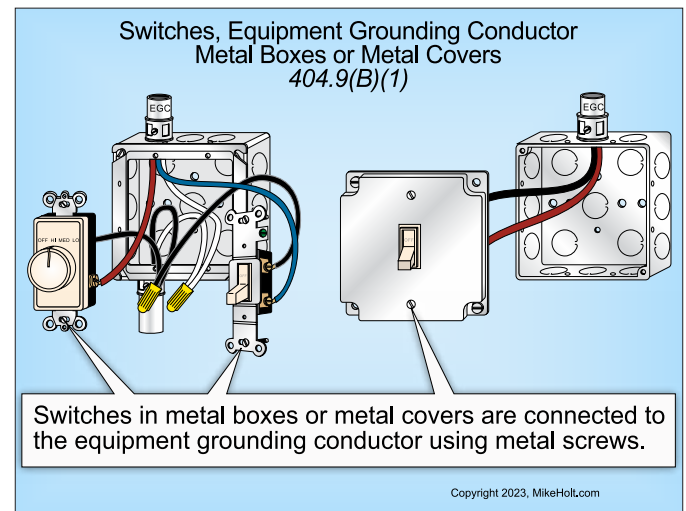
Metal Faceplates. Metal faceplates must be connected to the circuit equipment grounding conductor (metal faceplates secured with metal screws to the switch). ▶Figure 404-4



▶Figure 404-4

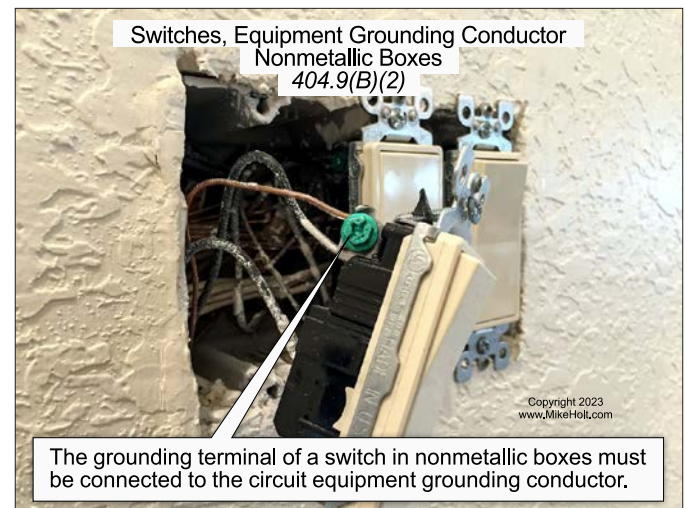
Switch. Switches in metal boxes or metal covers are connected to the equipment grounding conductor using metal screws [250.109].

▶Figure 404-5



▶Figure 404-5

(2) Nonmetallic Boxes. The grounding terminal of a switch in nonmetallic boxes must be connected to the circuit equipment grounding conductor. ▶Figure 404-6



▶Figure 404-6

Author's Comment:

- ▶ A switch with a metal faceplate installed in a nonmetallic box poses a shock hazard if it becomes energized. An effective ground-fault current path must be provided by connecting the metal faceplate with metal screws to a switch that is connected to an equipment grounding conductor [250.109].

Ex 1: Where no means exists within the box for bonding to an equipment grounding conductor, or if the wiring method at the existing switch does not contain an equipment grounding conductor, a switch without such a connection to the equipment grounding conductor is permitted for replacement purposes only. A switch installed under this exception must have a faceplate that is nonmetallic and noncombustible with nonmetallic screws, or the replacement switch must be GFCI protected.

Ex 2: Listed assemblies are not required to be bonded to an equipment grounding conductor if all the following conditions are met:

- (1) The device is provided with a nonmetallic faceplate and designed such that no metallic faceplate replaces the one provided.*
- (2) The device does not have a mounting means to accept other configurations of faceplates.*
- (3) The device is equipped with a nonmetallic yoke.*
- (4) Parts of the device that are accessible after the faceplate is installed are manufactured of nonmetallic material.*

Ex 3: An equipment grounding conductor is not required for bonding a snap switch with an integral nonmetallic enclosure complying with 300.15(E).

404.12 Bonding of Enclosures

Metal enclosures for switches and circuit breakers must be connected to an equipment grounding conductor of a type recognized in 250.118(A) [250.4(A)(3)].

Metal enclosures for switches and circuit breakers used as service equipment must be bonded to the service neutral conductor via the main bonding jumper to provide an effective ground-fault current path [250.92(A)].

Where nonmetallic enclosures are used with metal raceways or metal-armored cables, they must comply with 314.3 Ex 1 or Ex 2.

ARTICLE 406

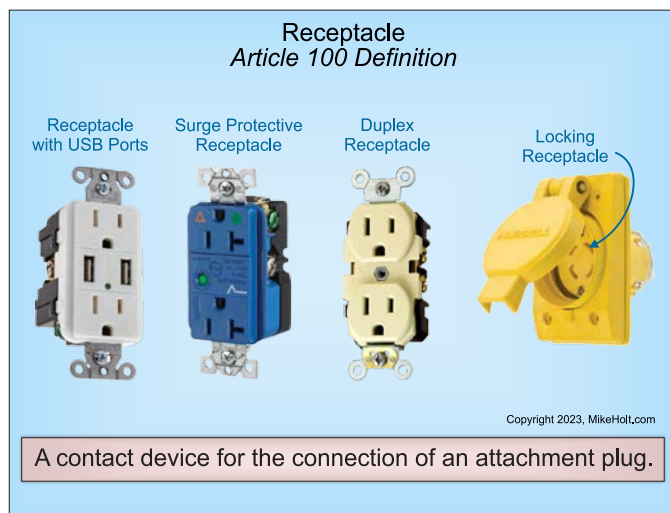
RECEPTACLES, ATTACHMENT PLUGS, AND FLANGED INLETS

Introduction to Article 406—Receptacles, Attachment Plugs, and Flanged Inlets

This article covers the rating, type, and installation of receptacles, attachment plugs, and flanged inlets. There are many types of receptacles such as self-grounding, isolated ground, tamper resistant, weather resistant, GFCIs and AFCIs, energy controlled, work surface and countertop assemblies, USBs, surge protectors, and so on. Topics covered in this material for Article 406 include:

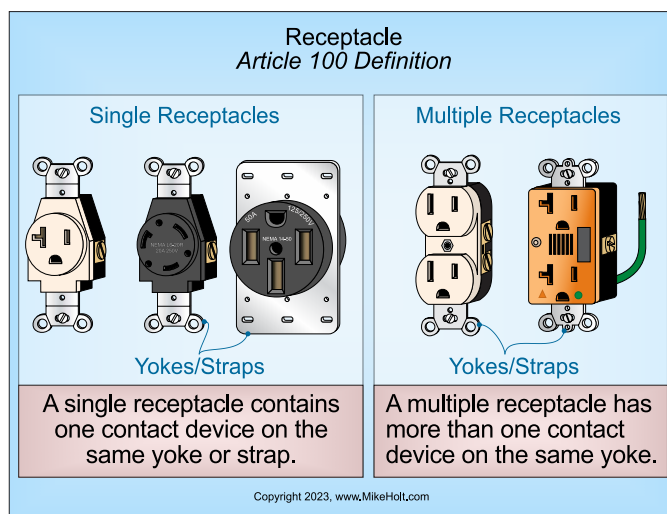
- ▶ Scope
- ▶ Receptacle Types and Ratings
- ▶ Equipment Grounding Conductor Terminals

According to Article 100, “Receptacle” is a contact device installed at an outlet for the connection of an attachment plug or equipment designed to mate with the contact device. ▶Figure 406-1



▶Figure 406-1

A single receptacle contains one contact device on the same yoke or strap. A multiple receptacle has more than one contact device on the same yoke or strap. ▶Figure 406-2



▶Figure 406-2

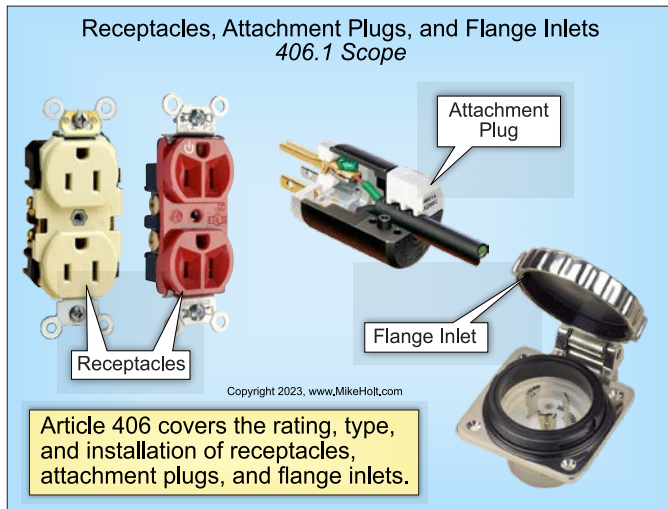
Author's Comment:

- ▶ A yoke (also called a “strap”) is the metal mounting structure for such items as receptacles, switches, switches with pilot lights, and switch/receptacles to name a few.

Note: A duplex receptacle is an example of a multiple receptacle with two receptacles on the same yoke or strap.

406.1 Scope

Article 406 covers the rating, type, and installation of receptacles, attachment plugs, and flanged inlets. ▶Figure 406-3

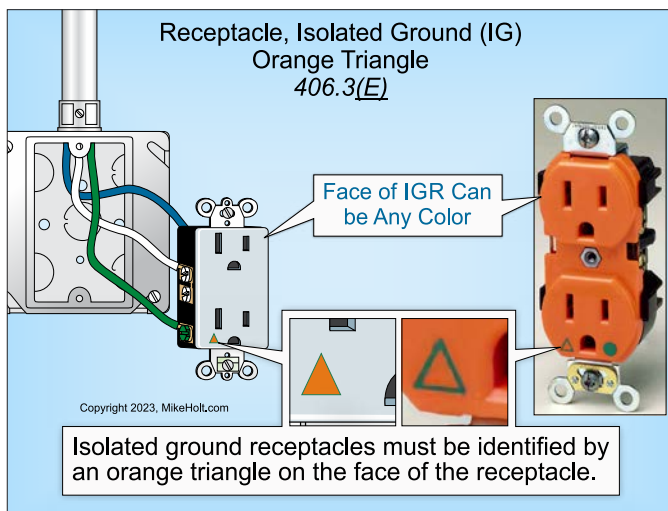


▶Figure 406-3

406.3 Receptacle Rating and Type

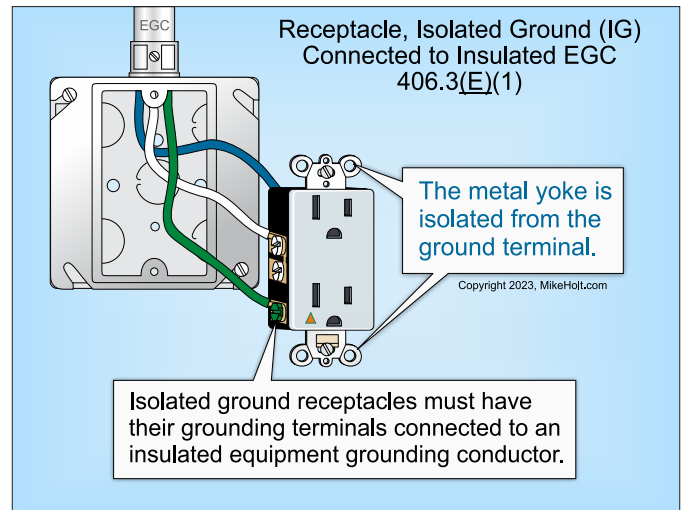
(E) Isolated Ground Receptacles. Isolated ground receptacles must be identified by an orange triangle on the face of the receptacle.

▶Figure 406-4



▶Figure 406-4

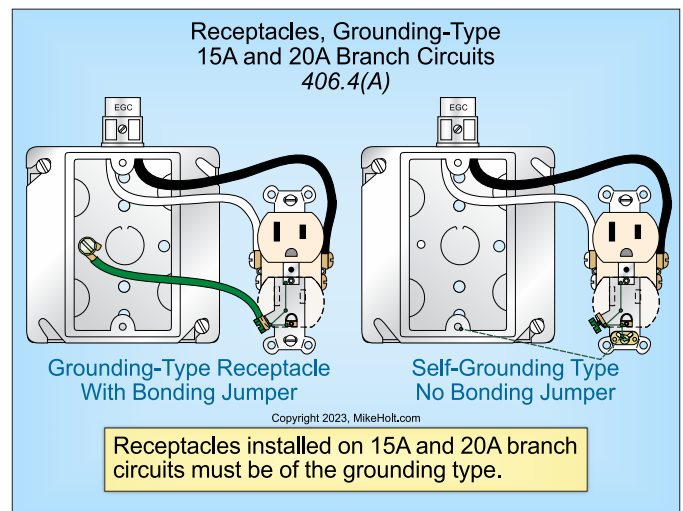
- (1) Isolated ground receptacles must have their grounding terminals connected to an insulated equipment grounding conductor in accordance with 250.146(D). ▶Figure 406-5



▶Figure 406-5

406.4 General Installation Requirements

(A) Grounding Type. Receptacles installed on 15A and 20A branch circuits must be of the grounding type, except as permitted for 2-wire receptacle replacements in 406.4(D)(2). ▶Figure 406-6



▶Figure 406-6

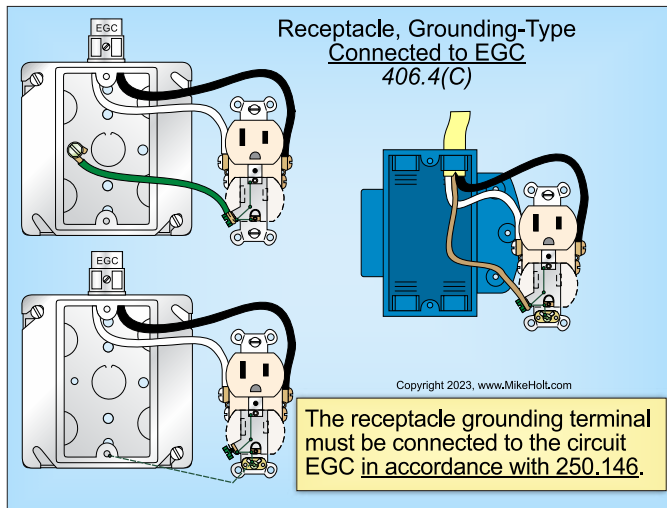
Grounding-type receptacles must be installed on circuits rated in accordance with Table 210.21(B)(1) for single receptacles and Table 210.21(B)(2) or Table 210.21(B)(3) for two or more receptacles.

Table 210.21(B)(3) Receptacle Ratings

Circuit Rating	Receptacle Rating
15A	15A
20A	15A or 20A
30A	30A
40A	40A or 50A
50A	50A

(C) Methods of Connection to Equipment Grounding Conductor.

The receptacle grounding terminal must be connected to the equipment grounding conductor of the circuit supplying the receptacle in accordance with 250.146. ▶Figure 406-7



▶Figure 406-7

Cord connectors must be connected to the circuit equipment grounding conductor.

Note 1: For acceptable types of equipment grounding conductors see 250.118(A).

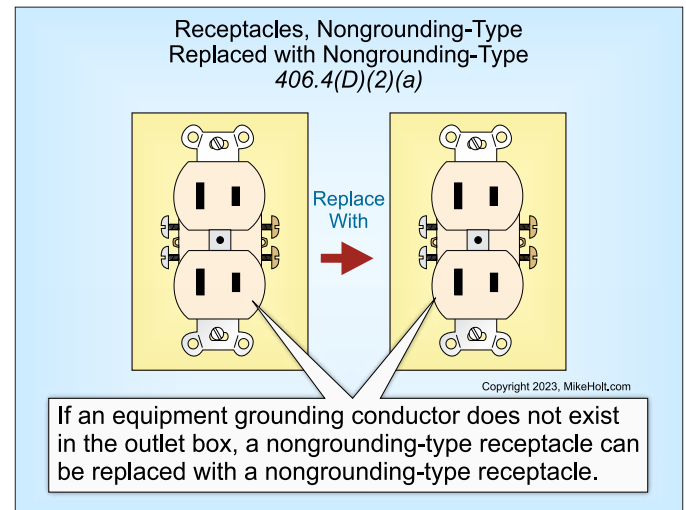
Note 2: See 250.130 for extensions of existing branch circuits.

(D) Receptacle Replacement. If the receptacle to be replaced is in a location that requires AFCI- and/or GFCI-type receptacles, the replacement receptacle must be installed at a readily accessible location and comply with 406.4(D)(1) through (D)(8).

(1) Equipment Grounding Conductor in Outlet Box. If an equipment grounding conductor exists in an outlet box, replacement receptacles must be of the grounding type and the receptacle's grounding terminal must be connected to the circuit equipment grounding conductor in accordance with 406.11.

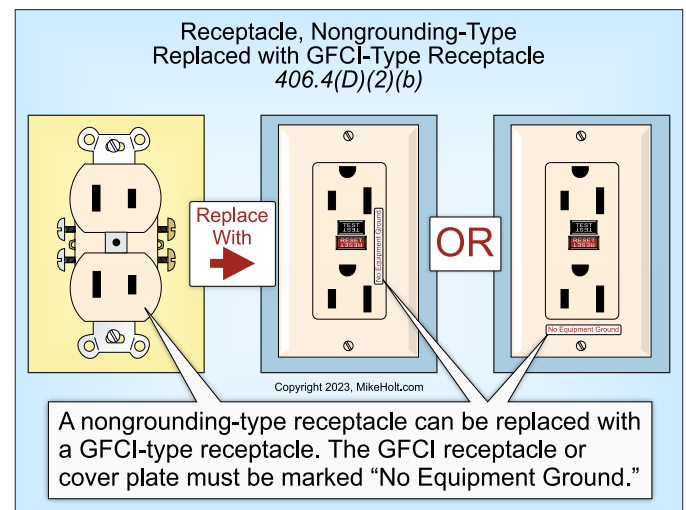
(2) No Equipment Grounding Conductor in Box. If an equipment grounding conductor does not exist in the outlet box, replacement receptacles can be a:

(a) Nongrounding-type receptacle. ▶Figure 406-8



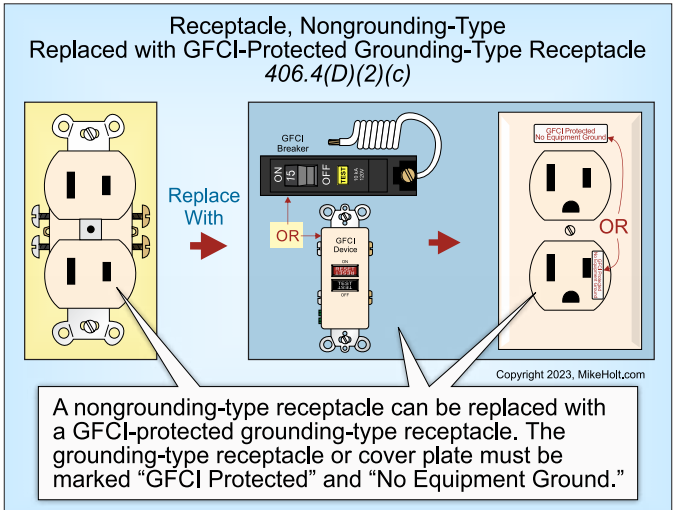
▶Figure 406-8

(b) GFCI-type receptacle. The GFCI receptacle or cover plate must be marked "No Equipment Ground." An equipment grounding conductor is not required from the GFCI-type receptacle to any receptacle outlets downstream. ▶Figure 406-9



▶Figure 406-9

(c) Grounding-type receptacle where it is GFCI protected. The grounding-type receptacle or cover plate must be marked “GFCI Protected” and “No Equipment Ground.” An equipment grounding conductor is not required from the GFCI-protected grounding-type receptacle to any receptacle outlets downstream. ▶Figure 406-10



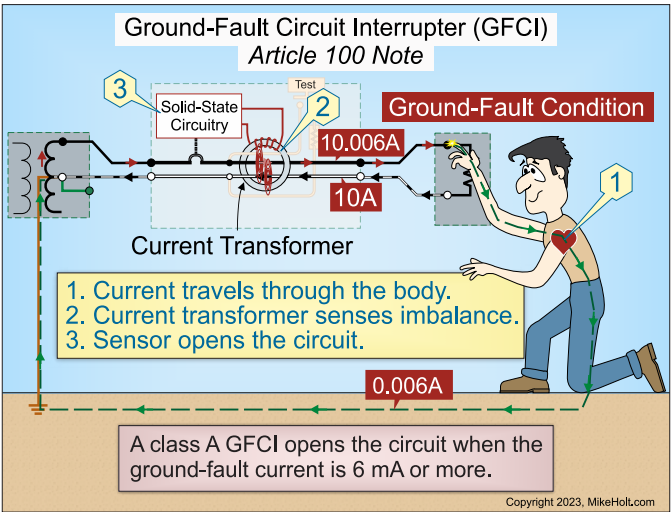
▶Figure 406-10

Author’s Comment:

- ▶ GFCI protection functions properly on a 2-wire circuit without an equipment grounding conductor because the circuit’s equipment grounding conductor serves no role in the operation of a GFCI device.

According to Article 100, “Ground-Fault Circuit Interrupter” is a device intended to protect people by de-energizing a circuit when ground-fault current exceeds the value established for a Class A device.

▶Figure 406-11



▶Figure 406-11

Note 1: Some equipment or appliance manufacturers require the branch circuit to the equipment or appliance to include an equipment grounding conductor.

Note 2: See 250.114 for a list of cord-and-plug-connected equipment or appliances that require an equipment grounding conductor.

406.11 Connecting Receptacle Grounding Terminal to Equipment Grounding Conductor

The grounding terminal of receptacles must be connected to an equipment grounding conductor in accordance with 250.146.