

# ARTICLE 517

## HEALTH CARE FACILITIES

### Introduction to Article 517—Health Care Facilities

Health care facilities differ from other types of buildings in many important ways. Article 517 is primarily concerned with those parts of health care facilities where human patients are examined and treated. Whether those facilities are permanent or movable, they still fall under the scope of this article. However, Article 517 wiring and protection requirements do not apply to business offices or waiting rooms, and they do not apply to animal veterinary facilities.

This article contains many specialized definitions that only apply to health care facilities. While you do not need to be able to quote these definitions, you should have a clear understanding of what the terms mean. As you study Parts II and III, keep in mind the special requirements of hospitals and why they exist. The requirements in those parts are highly detailed and not intuitively obvious. Two of the main objectives of Article 517, Parts II and III are:

- ▶ Maximize the physical protection of wiring by requiring metal raceways.
- ▶ Minimize electrical hazards by keeping the voltage between patients' bodies and medical equipment low.

Part IV addresses gas anesthesia stations. The primary objective of this part is to prevent ignition.

Part V addresses X-ray installations and really has two main objectives:

- ▶ Provide adequate ampacity and overcurrent protection for the branch circuits.
- ▶ Address the safety issues inherent in high-voltage equipment installations.

Part VI provides requirements for low-voltage communications systems such as fire alarms and intercoms. The primary objective here is to prevent compromising those systems with inductive couplings or other sources of interference.

Part VII provides requirements for isolated power systems where the main objective is to keep them truly isolated.

Be aware that the *NEC* is just one of the standards that applies to health care facilities, and there may be additional requirements from other standards and special requirements for sophisticated equipment.

## Part II. Wiring and Protection

### 517.13 Equipment Grounding Conductor for Receptacles and Fixed Electrical Equipment in Patient Care Spaces

Wiring in patient care spaces must comply with (A) and (B):

#### Author's Comment:

- ▶ Patient care spaces, as designated by the facility administrator, include patient rooms as well as examining rooms, therapy areas, treatment rooms, and some patient corridors. They do not include business offices, corridors, lounges, day rooms, dining rooms, or similar areas not classified as patient care spaces [517.2].
- ▶ Often referred to as redundancy, equipment grounding requirements in patient care spaces are based on the concept of two different types of equipment grounding conductors so if there is an installation error, the effective ground-fault current paths are not lost. One effective ground-fault current path is “mechanical” (the wiring method), and the other is of the “wire type.” Section 517.13(A) requires the wiring method to be a metal raceway or metal cable that qualifies as an equipment grounding conductor in accordance with 250.118(8) and (10)(b), and Section 517.13(B) requires an insulated copper equipment grounding conductor of the wire type in accordance with 250.118(1).

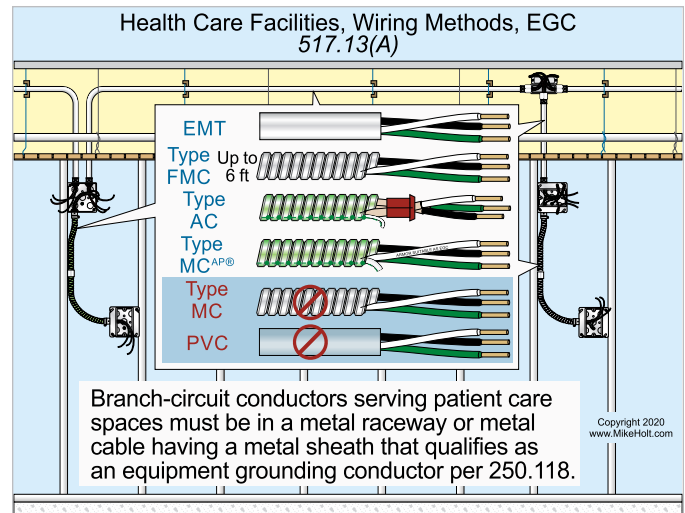
**(A) Wiring Methods.** Branch-circuit conductors serving patient care spaces must be in a metal raceway or metal cable having a metal sheath that qualifies as an equipment grounding conductor in accordance with 250.118(10)(b). ▶Figure 517-4

#### Author's Comment:

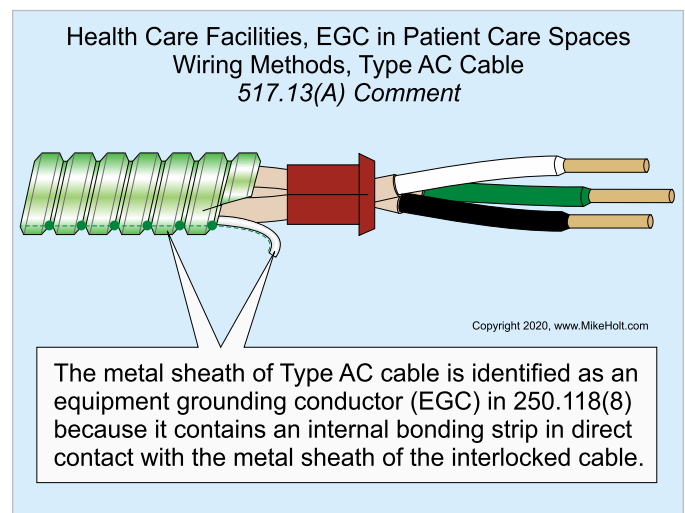
- ▶ The metal sheath of Type AC cable is identified as an equipment grounding conductor in 250.118(8) because it contains an internal bonding strip that is in direct contact with the metal sheath of the interlock cable. ▶Figure 517-5

#### Author's Comment:

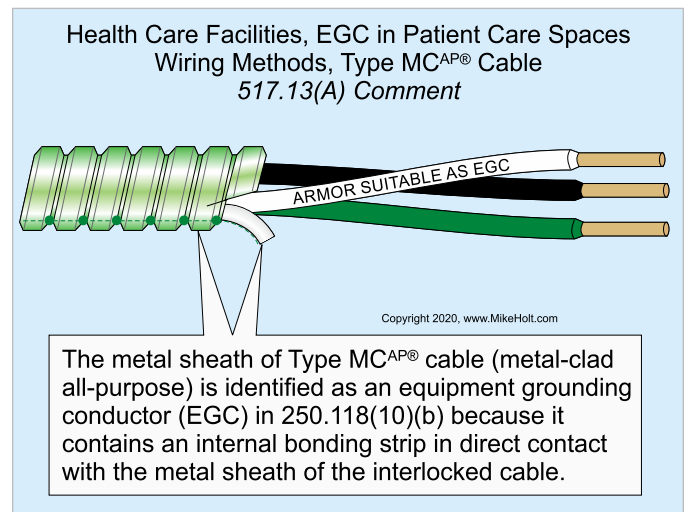
- ▶ The metal sheath of Type MC<sup>AP</sup> (metal-clad all-purpose) cable is identified as an equipment grounding conductor in 250.118(10)(b) because it contains an internal bonding strip that is in direct contact with the metal sheath of the interlock cable. ▶Figure 517-6



▶Figure 517-4



▶Figure 517-5

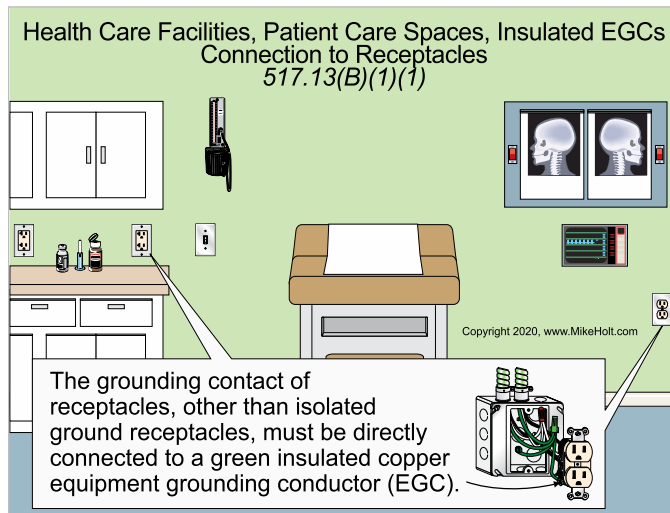


▶Figure 517-6

**(B) Insulated Equipment Grounding Conductors.**

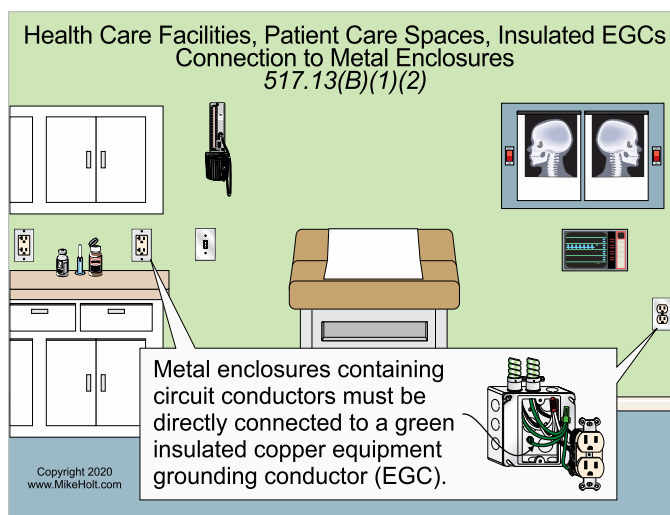
**(1) General.** The following equipment must be directly connected to an insulated copper equipment grounding conductor that has green insulation along its entire length. Such conductors must be contained in a suitable wiring method as required in 517.13(A).

- (1) The grounding contact of receptacles, other than isolated ground receptacles, must be directly connected to a green insulated copper equipment grounding conductor. ▶Figure 517-7



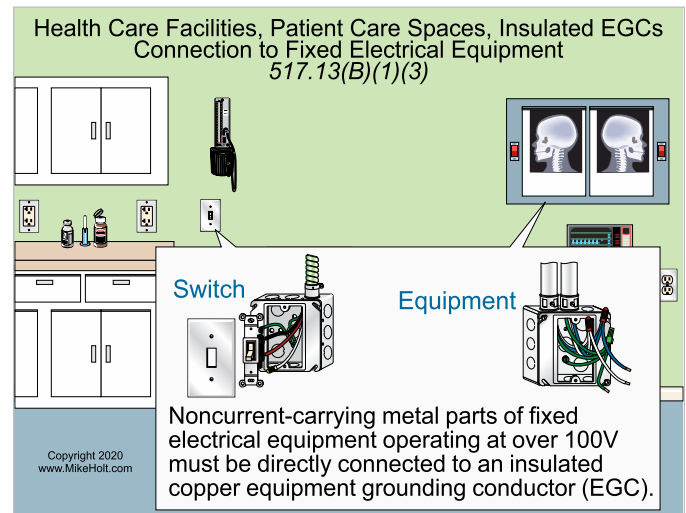
▶Figure 517-7

- (2) Metal enclosures containing circuit conductors must be directly connected to a green insulated copper equipment grounding conductor. ▶Figure 517-8



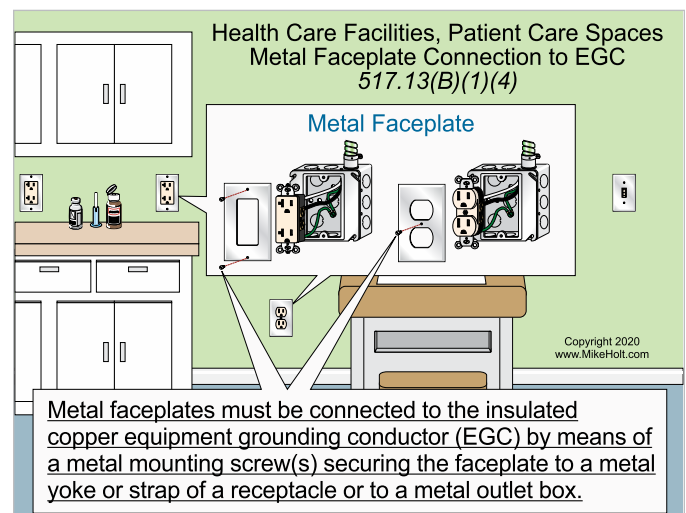
▶Figure 517-8

- (3) Noncurrent-carrying metal parts of fixed electrical equipment operating at over 100V must be directly connected to an insulated copper equipment grounding conductor. ▶Figure 517-9



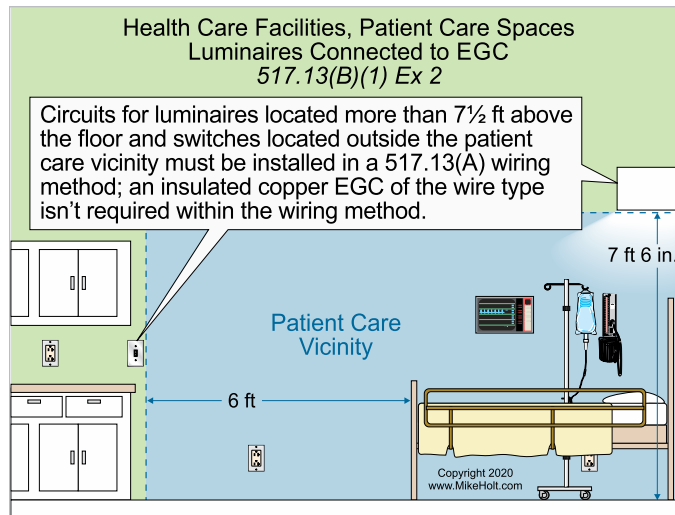
▶Figure 517-9

- (4) Metal faceplates must be connected to the insulated copper equipment grounding conductor by means of a metal mounting screw(s) securing the faceplate to a metal yoke or strap of a receptacle, or to a metal outlet box. ▶Figure 517-10



▶Figure 517-10

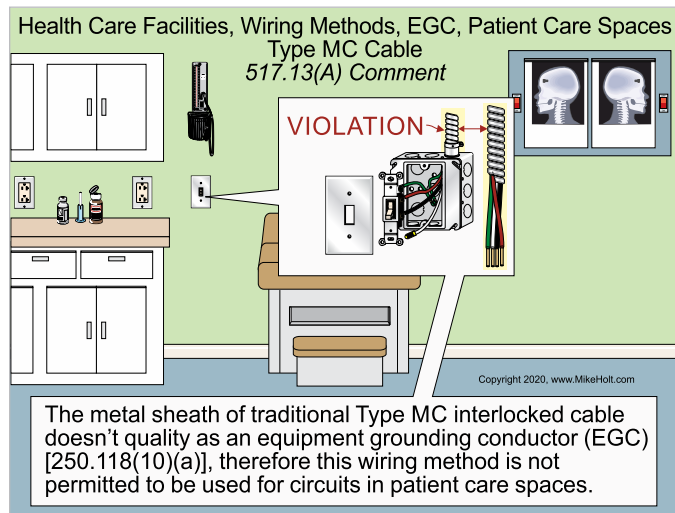
*Ex 2: Circuits for luminaires located more than 7½ ft above the floor and switches located outside the patient care vicinity must be installed in a 517.13(A) wiring method; an equipment grounding conductor of the wire type is not required within the wiring method. ▶Figure 517-11*



►Figure 517-11

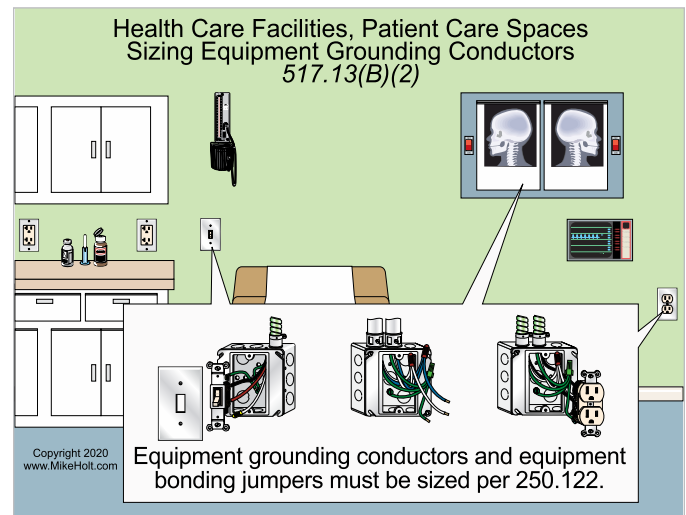
#### Author's Comment:

- The metal sheath of traditional Type MC interlocked cable does not qualify as an equipment grounding conductor [250.118(10)(a)], therefore this wiring method is not permitted to be used for circuits in patient care spaces. ►Figure 517-12



►Figure 517-12

(2) **Sizing.** Equipment grounding conductors and equipment bonding jumpers must be sized in accordance with 250.122. ►Figure 517-13



►Figure 517-13