

Figure 10-6
Grounding of a three-wire dc system

Rule 10-204 Grounding connections for alternating-current systems

In the connection to ground of an ac system, the ground connection must be effective and low impedance, and the neutral currents not shunted into the grounding circuits.

Subrule (1) requires that an ac system that must be grounded in accordance with Rule 10-106 be connected to a grounding electrode at both

- the consumer's service; and
- the transformer (or other source of supply).

The connection from the grounding electrode for the ac system is typically made in the consumer's service box or other service equipment, which becomes the main interconnection point for all the grounding and bonding of the system. An exception is made, however, for buildings housing livestock. Since cattle have shown high sensitivity to even minor voltage differentials, a device that controls the effects of stray earth currents (see Figure 10-5) is used to protect them from any small voltages that pass between the ground or floor on which they are standing and exposed metal in the area. In such installations, the grounding connection may be made within this protective device.

Subrule (1)(d) also requires that no connection to ground be made at any point beyond the consumer's service, except as provided in Rule 10-208, so that there are no neutral currents straying through the bonding system (see Figure 10-7).

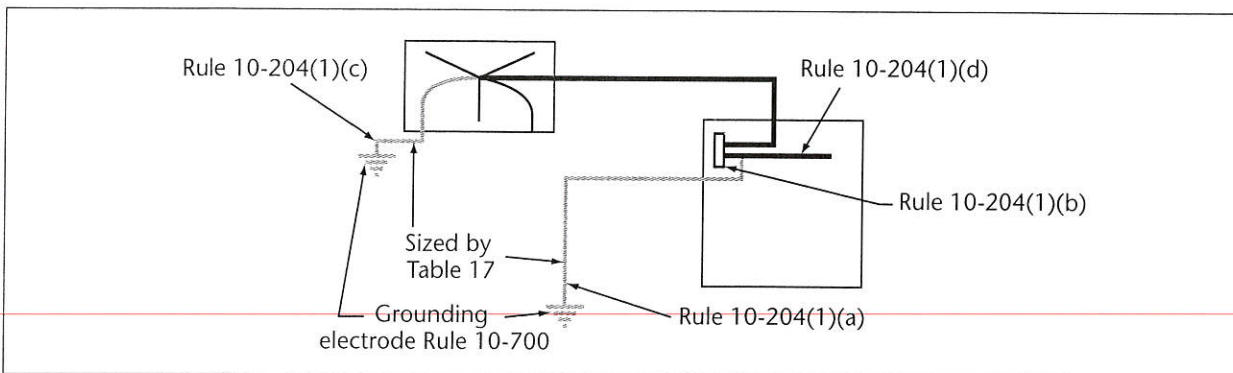


Figure 10-7
Grounding connection for ac systems



Standby or emergency power sources that can be connected to a system through a transfer switch present a special situation. When more than one power source supplies a system to be connected both to the consumer's service and to the alternative power source, Subrule (2) allows a single grounding electrode or the grouping of electrodes to form a single grounding electrode (see Figure 10-8).

In a typical service installation, a grounded conductor (or system grounded conductor) is the grounded conductor on the supply side of the service; it serves as a bonding conductor to carry fault currents and may also serve as a grounded circuit conductor to carry neutral currents between the consumer's service box (or its equivalent) and the transformer. A neutral conductor is a conductor that is always bonded to ground (see Figure 10-9). It is intended to carry the unbalanced load, so there must be at least three conductors in that circuit.

A grounded conductor is not always a neutral conductor of a circuit. However, when dealing with a two-wire circuit, the term neutral conductor is often used for the conductor that is connected to a conductor grounded at the supply end. It is important to distinguish between the strict and informal uses of the term when applying Rules that deal with neutral conductors.

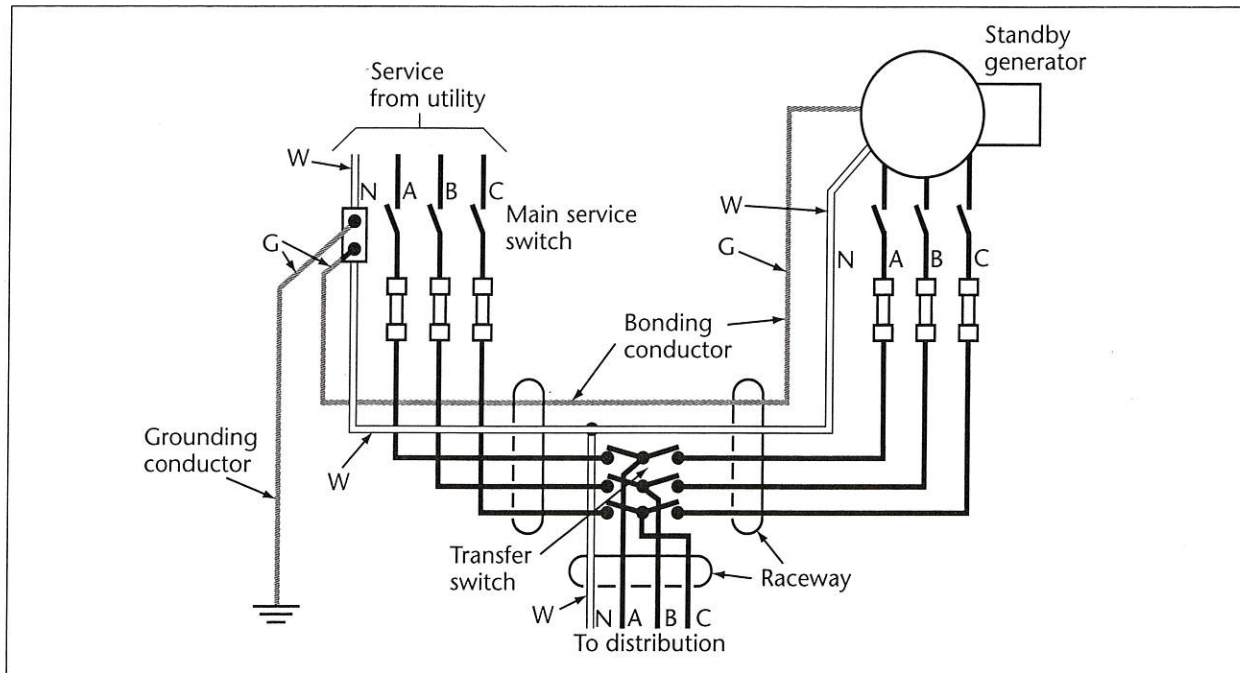


Figure 10-8
Power from two sources

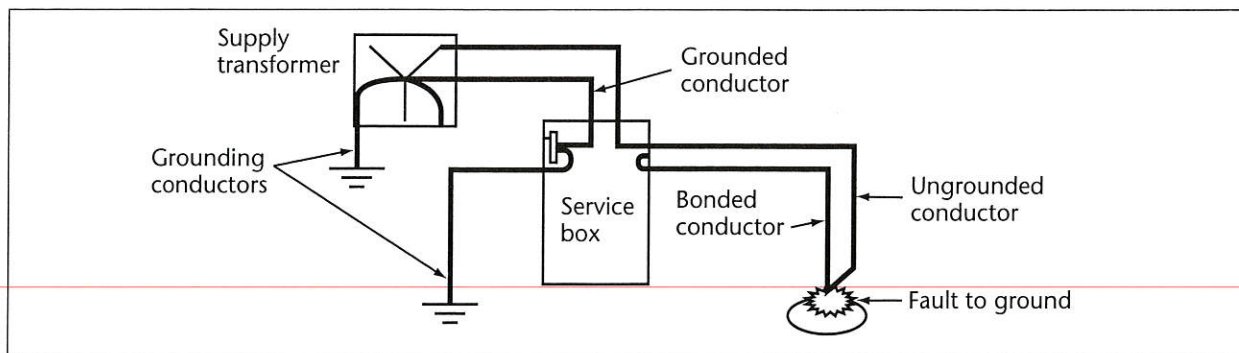


Figure 10-9
Typical system's neutral/grounded conductor

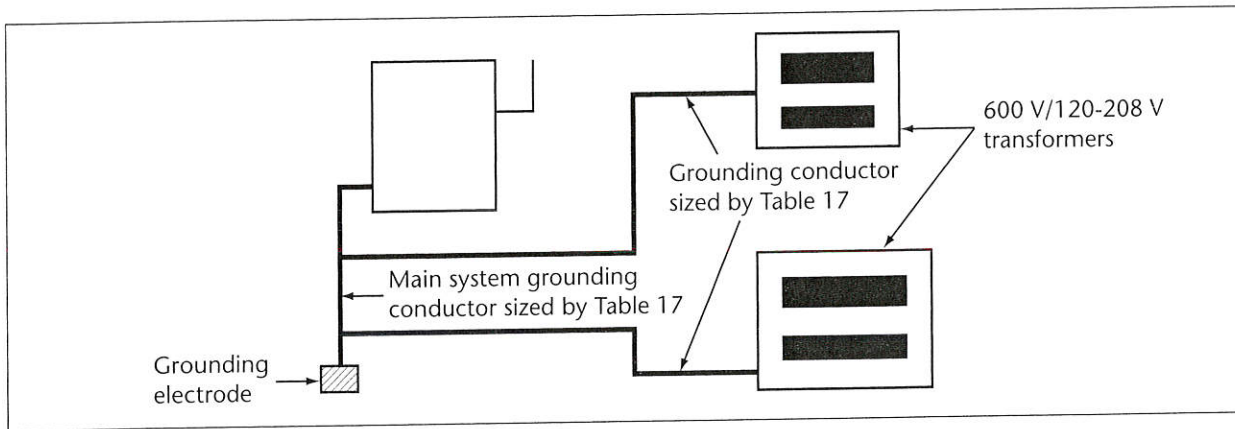


Figure 10-13
Individual grounding to main system grounding conductor

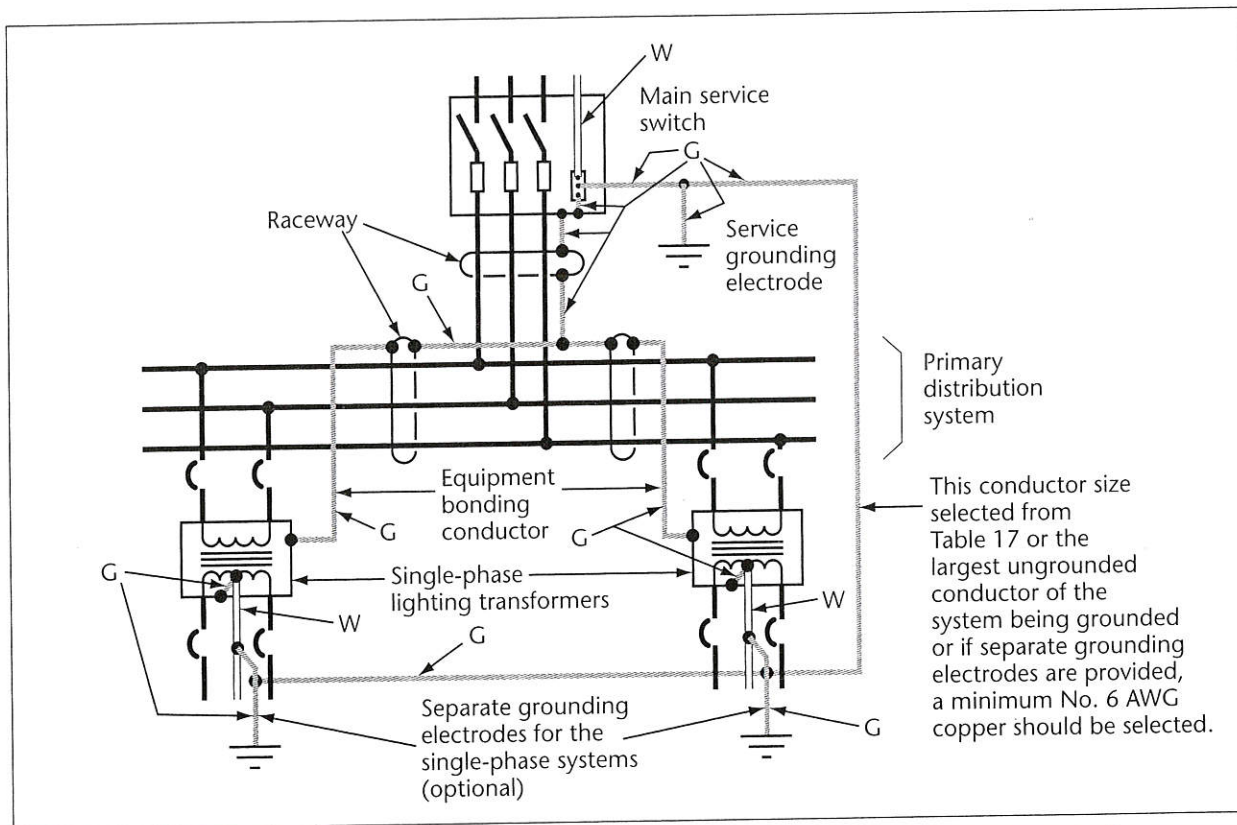


Figure 10-14
Grounding of isolated systems *<XFMRs>*