

Ground faults are arcing faults; arcing creates heat, heat creates fire, and heat will attack and destroy the conductor insulation.

GROUND-FAULT PROTECTION OF EQUIPMENT

Figure 14-2 illustrates the definition of *Ground-Fault Protection of Equipment*. The following lists some important points in the definition.

- 1. Protects equipment
- Comment:* There is no mention of personnel because the fault current trip setting of a ground-fault protector is of such magnitude that it could be fatal to a person.
- 2. Operates on line-to-ground fault current
- Comment:* The ground-fault protector gives no phase-to-phase fault protection. That is

the responsibility of the overcurrent protective device.

- 3. Opens the disconnecting means
- Comment:* There are no ringing bells, there are no flashing lights, there is no warning, but the circuit is opened, whether it is a service, feeder, or branch circuit. The disconnecting means can be a switch or a circuit breaker with proper current and voltage ratings that can be automatically operated. It is hoped that the overcurrent device nearest the ground fault will open the faulted circuit and disconnect only that part of the circuit before the ground-fault protection operates.

- 4. Operates at a current level less than the circuit overcurrent device is set for

Comment: A ground fault can draw current and still not trip the circuit overcurrent protective device. For example, a 1200-amp overcur-

rent device has an 800-amp load working and there is a 200-amp ground fault. The breaker sees the total current needed as 1000 amps and continues to furnish 1000 amps. The overcurrent device does not operate.

GROUND-FAULT PROTECTION EQUIPMENT REQUIRED AT SERVICE

Section 230-95 (figure 14-3) sets the basic rules for equipment ground-fault protection. All of the following conditions must be met before ground-fault protection of equipment is required:

- 1. Solidly grounded
- 2. Wye connected service
- 3. More than 150 volts to ground
- 4. Not exceeding 600 volts between phases
- 5. Disconnecting means rated for 1000 amps or more

- 6. All ungrounded conductors opened by service disconnecting means
- 7. Maximum setting of overcurrent device: 1200 amps
- 8. Maximum time delay for opening service disconnecting means: 1 second for ground-fault currents 3000 amps or larger
- 9. Equipment ground-fault protection permitted on distribution feeders
- 10. Equipment ground-fault protection permitted on disconnecting means rated at less than 1000 amps

Pinpointing the wye connection eliminates the delta or delta-with-a-grounded-leg connection. The limitations of over 150 volts to ground and under 600 volts between phases almost pinpoints the 277/480, nominal voltage, wye connection. The 120/208-volt wye connection is less than 150 volts to ground.

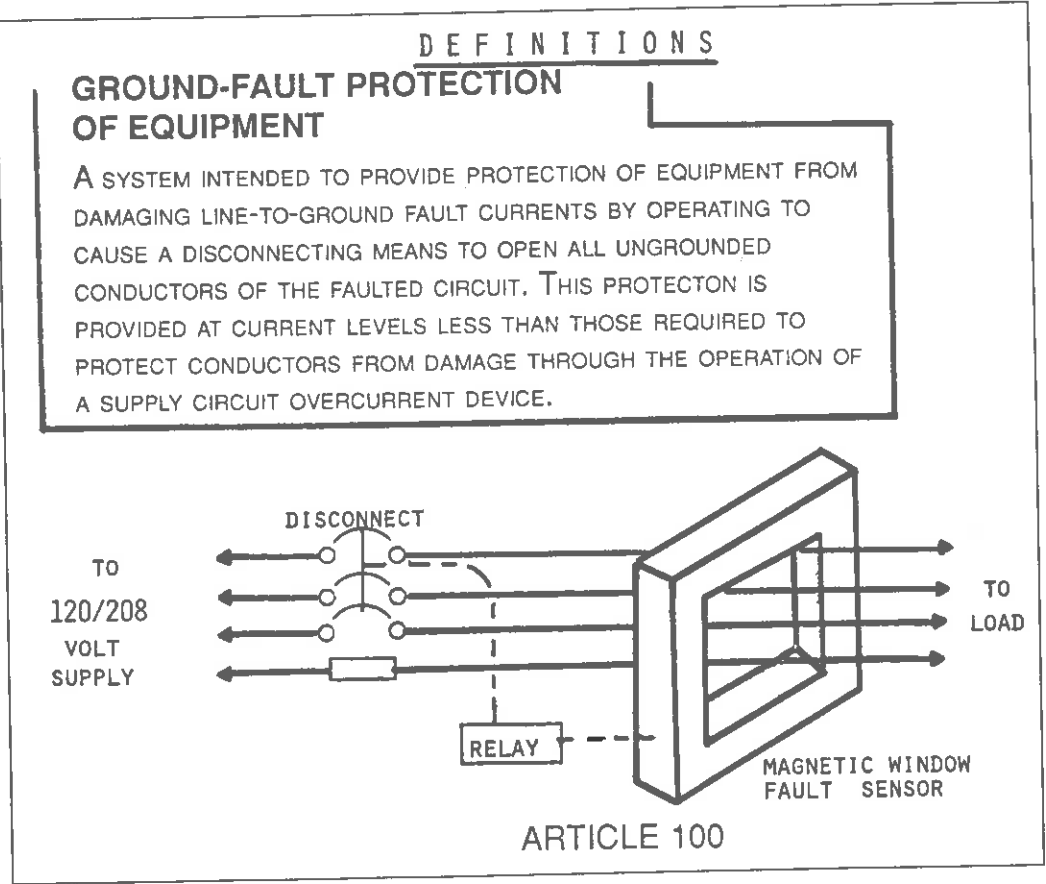


Fig. 14-2 Definition of *ground-fault protection of equipment*. Reprinted with permission from NFPA 70-1990, National Electrical Code®, Copyright © 1989, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the official position of the National Fire Protection Association, which is represented only by the standard in its entirety.

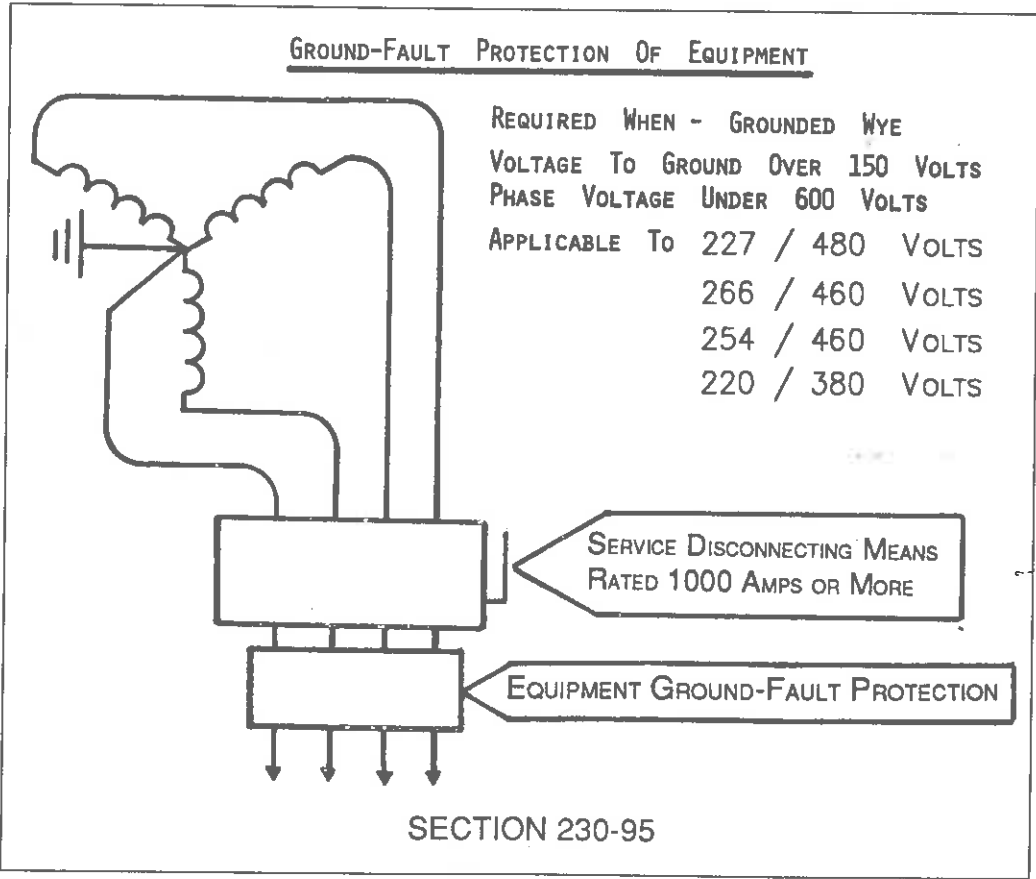


Fig. 14-3 Ground-fault protection of equipment is required by *Section 230-95*.