Ground detectors are required to be installed in ungrounded systems to detect such faults. A second insulation failure on a different ungrounded conductor would result in a line-to-line-to-ground fault, with the potential for more extensive damage to electrical equipment.

(B) Ground Detectors. Ground detectors shall be installed in accordance with the following:

(1) Ungrounded ac systems as permitted in 250.21(A)(1) through (A)(4) operating at not less than 120 volts and at 1000 volts or less shall have ground detectors installed on the system.

(2) The ground detection sensing equipment shall be connected as close as practicable to where the system receives its supply.

Ground detectors provide a visual indication, an audible signal, or both to alert system operators and maintenance personnel of a ground-fault condition in the electrical system. The notification of the ground-fault condition, rather than automatic interruption of the circuit, allows the operators of the process to take the necessary steps to initiate an orderly shutdown, to determine where the ground fault is located, and to safely repair the fault.

(C) Marking. Ungrounded systems shall be legibly marked "Caution: Ungrounded System Operating — _____Volts Between Conductors" at the source or first disconnecting means of the system. The marking shall be of sufficient durability to withstand the environment involved.

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250.24 Grounding of Service-Supplied Alternating-Current Systems.

(A) System Grounding Connections. A premises wiring system supplied by a grounded ac service shall have a grounding electrode conductor connected to the grounded service conductor, at each service, in accordance with 250.24(A)(1) through (A)–(4).

The grounded conductor of an ac service is connected to a grounding electrode system to limit the voltage to ground imposed on the system by lightning, line surges, and unintentional high-voltage crossovers. This connection also stabilizes the voltage to ground during operation, including short circuits.

See also

250.4(A) and **(B)** for the performance requirements for these connections

Δ **(1) General.** The grounding electrode conductor connection shall be made at any accessible point from the load end of the overhead service conductors, service drop, underground service conductors, or service lateral to the terminal or bus to which the grounded service conductor is connected at the service disconnecting means.

Informational Note: See Article 100 for definitions of *Service Conductors, Overhead; Service Conductors, Underground; Service Drop;* and *Service Lateral.*

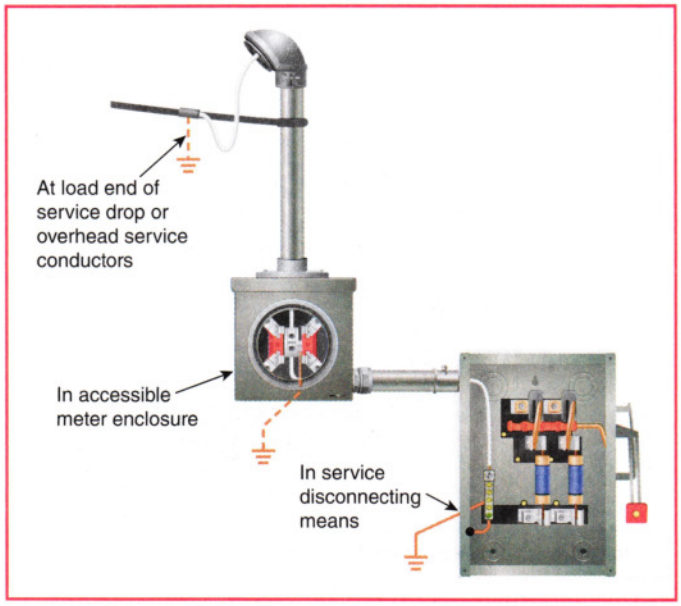

EXHIBIT 250.7 Three locations on an overhead service where the GEC is permitted to be connected to the grounded service conductor.

Allowing various connection locations meets the overall objectives for grounding while permitting a variety of practical options. Exhibit 250.7 illustrates three possible connection points where the GEC is permitted to be connected to the grounded service conductor. The accessibility to the point of connection must be approved by the AHJ based on local conditions such as locked meter socket enclosures.

Δ **(2) Outdoor Transformer.** If the transformer supplying the service is located outside the building, at least one additional grounding connection shall be made from the grounded service conductor to a grounding electrode, either at the transformer or elsewhere outside the building.

Exception: The additional grounding electrode conductor connection shall not be made on impedance grounded systems. Impedance grounded systems shall meet the requirements of 250.36 or 250.187, as applicable.

Outdoor installations are susceptible to lightning as well as accidental primary-to-secondary crossovers. The connection outside a building helps mitigate the effects of these influences on the interior portion of the premises wiring system. Exhibit 250.8 illustrates two grounding electrode connections — one at the service equipment installed inside the building and one installed at the transformer. At least one of those connections must be located outside the building as required by 250.24(A)(2).

(3) Dual-Fed Services. For services that are dual fed (double ended) in a common enclosure or grouped together in separate enclosures and employing a secondary tie, a single grounding electrode conductor connection to the tie point of the grounded conductor(s) from each power source shall be permitted.