DEPARTMENT OF LABOR AND INDUSTRY

Grounding and bonding for detached buildings or structures

Caution: Multiple feeders may create hazardous conditions

Question: Does an existing 3-wire feeder need to have an equipment grounding conductor (EGC) installed when a separate, second 4-wire feeder is added to a building or structure?

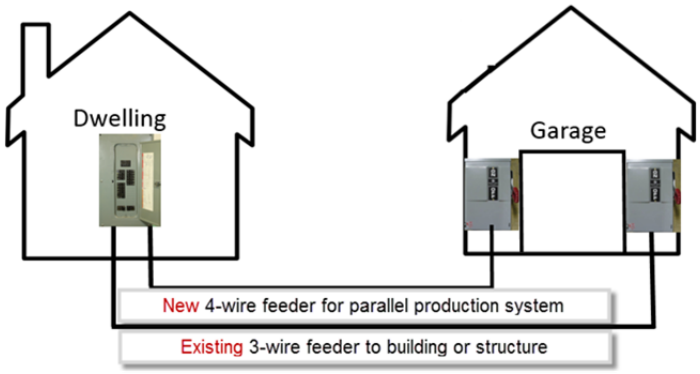
For the purpose of the question and answer the following terms are used:

- **3-wire** is defined as two ungrounded conductors and one grounded conductor
- **4-wire** is defined as two ungrounded conductors, one grounded conductor and one equipment grounding conductor

Answer: Yes

National Electrical Code (NEC) 225.30 (A) to (F) allows a separate, second feeder to a building or structure under certain circumstances. For this example, let's assume a new parallel production (solar PV) system with a 4-wire feeder has been installed on an existing garage that is supplied by an existing 3-wire feeder for the general lighting. In NEC 250.32(B)(1) Exception No. 1, the NEC allows an existing 3-wire feeder to remain in place where the neutral (grounded conductor) is bonded to the building disconnecting means and all three conditions in the code are met; the existing installation is considered to be in compliance with the code that was in effect at the time of original installation.

However, in this situation, the additional 4-wire feeder and connection to the common grounding electrode at the existing building (required by NEC 250.50) creates a condition where the neutral conductor in the existing 3-wire feeder would be in parallel with the EGC from the new 4-wire feeder, which would be a violation of NEC 250.142.



To ensure that neutral current is not continuously flowing on the new 4-wire feeder EGC, a new EGC would be required to be installed with the existing 3-wire feeder conductors and installed according to NEC 300.5(B). The new EGC routed with the existing 3-wire feeder would be sized based on the overcurrent protection on the supply side of the feeder, according to NEC table 250.122.
The equipment grounding conductors and neutral conductors need to be separated to ensure that EGC's are not carrying any neutral current under normal operating conditions. The feeder EGCs must be extended to the building's disconnecting means and be connected to the building's common grounding electrode system.