

**WAC 296-46B-250 Wiring and protection—Grounding and bonding.**

**028 (D) (3) Separately derived system with more than one enclosure.**

(1) NEC 250.28 (D) (3) is amended to read: Where a separately derived system supplies more than a single enclosure, the system bonding jumper for each enclosure shall be sized in accordance with 250.28 (D) (1) based on the largest ungrounded feeder/tap conductor serving that enclosure, or a single system bonding jumper shall be installed at the source and sized in accordance with 250.28 (D) (1) based on the equivalent size of the largest supply conductor determined by the largest sum of the areas of the corresponding conductors of each set.

**052 Grounding electrodes.**

(2) Except for mobile/manufactured homes, a concrete encased grounding electrode must be installed and used at each new building or structure that is built upon a permanent concrete foundation. The electrode must comply, with NEC 250.52 (A) (3). Inspection of the electrode may be accomplished by the following methods:

(a) At the time of inspection of other work on the project, providing the concrete encased electrode is accessible for a visual inspection;

(b) At the time of the service inspection providing the installer has provided a method so the inspector can verify the continuity of the electrode conductor along its entire length, with a minimum 20 foot linear span between testing points (e.g., attaching a length of copper wire to one end of the electrode that reaches the location of the grounding electrode conductor that will enable the inspector to measure the resistance with a standard resistance tester). The concrete encased electrode does not have to be accessible for a visual inspection; or

(c) Other method when prior approval, on a job site basis, is given by the inspector.

If a special inspection trip is required to inspect a grounding electrode conductor, a trip fee will be charged for that inspection in addition to the normal permit fee.

**Exception:** If the concrete encased grounding electrode is not available for connection, a ground ring must be installed per NEC 250 or other grounding electrode installed per NEC 250 verified to measure 25 ohms or less to ground. Resistance verification testing must be performed by an independent firm having qualified personnel and proper equipment. A copy of the testing procedures used and a written resistance test record signed by the person performing the test must be available at the time of inspection. The resistance test record must include test details including, but not limited to, the type of test equipment used, the last calibration date of the test equipment, and all measurements taken during the test.

**053 (A) (2) Resistance of rod, pipe, and plate electrodes.**

(3) For rod, pipe, and plate electrodes other than those installed in accordance with the exception in subsection (2) of this section, if a ground resistance test is not performed to ensure a resistance to ground of 25 ohms or less, two or more electrodes as specified in NEC 250.52 must be installed a minimum of 6 feet apart. A temporary construction service is not required to have more than one made electrode.

(4) For services only, when multiple buildings or structures are located adjacent, but structurally separate from each other, any installed rod, pipe, or plate electrodes used for those services must be installed so that each building's or structure's electrodes are not less than 6 feet apart from the adjacent building's or structure's electrodes.

**064 Grounding electrode conductor installation - Physical protection.**

(5) Grounding electrode conductors will be considered to be not exposed to physical damage when the conductor(s) are:

(a) Buried more than 12 inches deep in the earth outside the building's footprint;

(b) Encased or covered by 2 inches of concrete or asphalt;

(c) Located inside the building footprint and protected by the building's structural elements or when inside and determined, by the inspector, to not be subject to physical damage; or

(d) Enclosed by a metal or nonmetallic raceway or enclosure. The raceway or enclosure must be approved to protect from severe physical damage if it is not protected by appropriate physical barriers from contact with vehicles, lawn mowers, and other equipment that might damage the conductor or enclosure.

**068 Accessibility.**

(6) The termination point of a grounding electrode conductor tap to the grounding electrode conductor must be accessible unless the connection is made using an exothermic or irreversible compression connection.

**090 Bonding.**

(7) Metallic stubs or valves used in nonmetallic plumbing systems are not required to be bonded to the electrical system unless required by an electrical equipment manufacturer's instructions.

(8) Hot and cold water plumbing lines are not required to be bonded together if, at the time of inspection, the inspector can determine the lines are mechanically and electrically joined by one or more metallic mixing valves.

**104(B) Bonding - Other metal piping.**

(9) For flexible metal gas piping, installed new or extended from an existing rigid metal piping system, either:

(a) Provide a copy of the manufacturer's bonding instructions to the inspector at the time of inspection and follow those instructions; or

(b) The bonding conductor for the gas system must:

(i) Be a minimum 6 AWG copper; and

(ii) Terminate at:

(A) An accessible location at the gas meter end of the gas piping system on either a solid iron gas pipe or a cast flexible gas piping fitting using a listed grounding connector; and

(B) Either the service equipment enclosure, service grounding electrode conductor or electrode, or neutral conductor bus in the service enclosure.

**184 Solidly grounded neutral systems over 1000 volts.**

(10) In addition to the requirements of NEC 250.184(A), the following applies for:

(a) Existing installations.

(i) The use of a concentric shield will be allowed for use as a neutral conductor for extension, replacement, or repair, if all of the following are complied with:

(A) The existing system uses the concentric shield as a neutral conductor;

(B) Each individual conductor contains a separate concentric shield sized to no less than thirty-three and one-half percent of the ampacity of the phase conductor for three-phase systems or one hundred percent of the ampacity of the phase conductor for single-phase systems;

(C) The new or replacement cable's concentric shield is enclosed inside an outer insulating jacket; and

(D) Existing cable (i.e., existing cable installed directly in the circuit between the work and the circuit's overcurrent device) successfully passes the following tests:

- A cable maintenance high potential dielectric test. The test must be performed in accordance with the cable manufacturer's instruction or the 2019 ANSI/NETA maintenance test specifications; and
- A resistance test of the cable shield. Resistance must be based on the type, size, and length of the conductor used as the cable shield using the conductor properties described in NEC Table 8 Conductor Properties.

An electrical engineer must provide a specific certification to the electrical plan review supervisor in writing that the test results of the maintenance high potential dielectric test and the resistance test have been reviewed by the electrical engineer and that the cable shield is appropriate for the installation. The electrical engineer must stamp the certification document with the engineer's stamp and signature. The document may be in the form of a letter or electrical plans.

Testing results are valid for a period of seven years from the date of testing. Cable will not be required to be tested at a shorter interval.

(ii) A concentric shield used as a neutral conductor in a multi-grounded system fulfills the requirements of an equipment grounding conductor.

(b) New installations.

(i) New installations do not include extensions of existing circuits.

(ii) The use of the concentric shield will not be allowed for use as a neutral conductor for new installations. A listed separate neutral conductor meeting the requirements of NEC 250.184(A) must be installed.

[Statutory Authority: Chapter 19.28 RCW, including RCW 19.28.031 and 19.28.251. WSR 20-11-053, § 296-46B-250, filed 5/19/20, effective 7/1/20. Statutory Authority: Chapter 19.28 RCW, RCW 19.28.031 and 19.28.251. WSR 19-15-117, § 296-46B-250, filed 7/23/19, effective 8/23/19. Statutory Authority: Chapter 19.28 RCW, RCW 19.28.010 and 19.28.031. WSR 17-12-021, § 296-46B-250, filed 5/30/17, effective 7/1/17. Statutory Authority: Chapter 19.28 RCW. WSR 14-11-075, § 296-46B-250, filed 5/20/14, effective 7/1/14; WSR 13-03-128, § 296-46B-250, filed 1/22/13, effective 3/1/13. Statutory Authority: RCW 19.28.006, 19.28.010, 19.28.031, 19.28.041, 19.28.061, 19.28.101, 19.28.131, 19.28.161, 19.28.171, 19.28.191, 19.28.201, 19.28.211, 19.28.241, 19.28.251, 19.28.281, 19.28.311, 19.28.321, 19.28.400, 19.28.420, 19.28.490, 19.28.551. WSR 08-24-048, § 296-46B-250, filed 11/25/08, effective 12/31/08; WSR 06-24-041, § 296-46B-250, filed 11/30/06, effective 12/31/06; WSR 06-05-028, § 296-46B-250, filed 2/7/06, effective 5/1/06; WSR 05-10-024, § 296-46B-250, filed 4/26/05, effective 6/30/05. Statutory Authority: RCW 19.28.006, 19.28.010, 19.28.031, 19.28.041, 19.28.061, 19.28.101, 19.28.131, 19.28.161, 19.28.171, 19.28.191, 19.28.201, 19.28.211, 19.28.241, 19.28.251, 19.28.271, 19.28.311, 19.28.321, 19.28.400, 19.28.420, 19.28.490, 19.28.551, 2003 c 399, 2003 c 211, 2003 c 78, and 2003 c 242. WSR 04-12-049, § 296-46B-250, filed 5/28/04, effective 6/30/04. Statutory Authority: RCW 19.28.006, 19.28.010, 19.28.031, 19.28.041, 19.28.061, 19.28.101, 19.28.131, 19.28.161, 19.28.171, 19.28.191, 19.28.201, 19.28.211, 19.28.241, 19.28.251, 19.28.271, 19.28.311, 19.28.321,

19.28.400, 19.28.420, 19.28.490, 19.28.551, 2002 c 249, chapters 34.05 and 19.28 RCW. WSR 03-09-111, § 296-46B-250, filed 4/22/03, effective 5/23/03.]