

BONDING AND GROUNDING TERMINOLOGY

IAEI's Soares Book on Grounding and Bonding places a huge emphasis on definitions of words and terms used for proper application of Code rules relating to the subject of grounding and bonding. Using a common language of communication is imperative to understanding this subject and applying the Code to installations and systems in the field, as clearly indicated in Chapter 1 of this book. It is important that words and terms related to this subject mean what is implied by definition for all *NEC* users.

NEC Grounding and Bonding Revisions

In recent editions of the *Code*, there have been numerous revisions to many of the grounding and bonding terms used in the *NEC*. These revisions were the result of significant efforts of a special task group assigned by the *NEC* Correlating Committee. The primary objective of this task group was to ensure the accuracy of defined terms related to grounding and bonding, differentiate between the two concepts, and verify the use of these terms is uniform and consistent throughout the *NEC*. The work of this task group resulted in simply changing the meaning of defined grounding and bonding terms to improve clarity and usability within the *NEC* requirements where these terms are used.

Code rules that use defined grounding and bonding terms were revised, as needed, to clarify the meaning of the rule and to ensure that these terms are used consistently as defined in Article 100. In many instances, rules were revised to become more prescriptive for *NEC* users and to provide clear direction on what is intended to be accomplished from a performance standpoint. As an example, many rules throughout the *Code* used the phrase “shall be grounded,” which was replaced with the phrase “shall be connected to an equipment grounding conductor.” This simple revision will relay to the *NEC* user that a certain object not only needs to be grounded but, more importantly, “how” the object is to be grounded.

bonding presented in Chapter 1 to have a clear understanding of the material being presented.

References

¹Soares, “Grounding Electrical Distribution Systems for Safety, 1966

²Available from IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, (800) 678-4333

Review Questions

1. “Connected to establish electrical continuity and conductivity” best defines which of the following _____.
 - a. grounded (grounded)
 - b. bonded (bonding)
 - c. adequately bonded
 - d. effectively grounded
2. The terms “neutral conductor” and “grounded conductor” mean the same thing and can be used interchangeably throughout the *NEC*.
 - a. True
 - b. False
3. A _____ premises wiring system is one that is derived from a source of electric energy or equipment other than a service such as, a generator, transformer or converter windings that have no direct connection to the circuit conductors originating in another system, except through grounding and bonding connections.
 - a. identified
 - b. open neutral
 - c. isolated power
 - d. separately derived
4. “Connected (connecting) to ground or to a conductive body that extends the ground connection” is best defined as?
 - a. grounded (grounding)
 - b. grounded conductor
 - c. being identified
 - d. being bonded

5. "A system or circuit conductor that is intentionally grounded" is best defined as ____?
 - a. insulated
 - b. bonded
 - c. a grounded conductor
 - d. an equipment grounding conductor

6. "A conducting connection, whether intentional or accidental, between any of the conductors of an electrical system whether it be from line-to-line or from line to the grounded conductor," describes a(n) ____?
 - a. Phase fault
 - b. Short Circuit
 - c. Overload
 - d. Ground Fault

7. "An unintentional electrically conductive connection between an ungrounded conductor of an electrical circuit and the normally non-current-carrying conductors, metallic enclosures, metallic raceways, metallic equipment, or earth" is defined as a(n) ____?
 - a. Phase Fault
 - b. Overload
 - c. System ground
 - d. Ground fault

8. "A conducting object through which a direct connection to earth is established" is defined as a(n):
 - a. equipment grounding
 - b. grounding electrode
 - c. main bonding jumper
 - d. earthing conductor

9. "A conductor used to connect the system grounded conductor or the equipment to a grounding electrode or to a point on the grounding electrode system" best defines which of the following?
 - a. main bonding jumper
 - b. grounding electrode conductor
 - c. feeder bonding jumper
 - d. grounded

10. A conductor installed on the supply side of a service or within a service-equipment enclosure(s), or for a separately derived system, that ensures the required electrical conductivity between metal parts required to be electrically connected is defined as a(n) ____?
 - a. main bonding jumper
 - b. supply-side bonding jumper
 - c. equipment grounding conductor
 - d. system bonding jumper

11. The conductor used to connect the grounded circuit conductor and the supply-side bonding jumper, or the equipment grounding conductor, or both, at a separately derived system is defined as the ____?
 - a. main bonding jumper
 - b. system bonding jumper
 - c. equipment grounding conductor
 - d. bonding jumper

12. The effective ground-fault current path must be installed in a manner that creates a path that is _____.
 - a. electrically continuous
 - b. has the capacity to conduct safely the maximum ground-fault current likely to be imposed on it
 - c. has sufficiently low impedance to limit the voltage to ground and to facilitate the operation of the circuit protective devices in the circuit
 - d. all of the above

13. In a dc electrical circuit, the total opposition to current is due primarily to _____.
 - a. current
 - b. voltage
 - c. impedance
 - d. resistance

14. In an electrical circuit, current in the circuit will always attempt to return to which of the following _____.
 - a. the earth
 - b. the service
 - c. the source
 - d. the load

15. For current to be present, there must be a complete ____.
- grounding conductor
 - conduit system
 - circuit
 - overcurrent protective device
16. Current in an electrical circuit will take _____ to return to the source.
- only the path of least resistance
 - any and all paths available
 - a high impedance path only
 - the path in the earth
17. The total opposition to current in an AC circuit is the _____ of the circuit.
- resistance
 - impedance
 - capacitance
 - inductance
18. The higher the impedance or resistance of a circuit, the _____ the amount of current in the circuit.
- lower
 - higher
 - same
 - different
19. The *NEC* in recent cycles has continued to migrate away from the use of the _____ conductor for grounding of equipment downstream of the main bonding jumper at the service or the system bonding jumper at a separately derived system.
- equipment grounding
 - grounded (neutral)
 - bonding
 - grounding electrode
20. A 480-volt, 3-phase circuit is connected to an electric heater rated at 480 volts, 3-phase/7500 watts. The current in this circuit is _____ amperes.
- 13.6
 - 9.03
 - 15.7
 - 27.9
21. The equipment grounding conductor system normally only carry current in a _____ situation.
- fault
 - normal
 - unbalanced
 - emergency
22. The equipment grounding conductor serves to ____.
- provide an effective ground-fault current path
 - ground the equipment or its enclosure by connecting to the grounding point of the system
 - perform bonding functions
 - all of the above