Outline for Grounding and Bonding
8 hours Code Class

Intro and Sign in
7:30 – 7:45

1. Article 100 Definitions 1.25 Hour(s) 7:45 - 9:00
    a. Ground
    b. Ground Fault
    c. Grounded
    d. Solidly Grounded
    e. Grounded Conductor
    f. Ground Fault Current Path
    g. Effective Ground Fault Current Path
    h. Equipment Grounding Conductor (EGC)
    i. Grounding Electrode
    j. Grounding Electrode Conductor
    k. Supply Side Bonding Jumpers
    l. Bonding
    m. Bonding Jumpers
    n. Main Bonding Jumper
    o. System Bonding Jumper

2. Scope of Grounding and Bonding 250.1
    a. What does this article cover?
3. 250.4 General Requirements for Grounding and Bonding
    a. A 1 Electrical System Grounding
    b. A 5 Effective Ground Fault Current Path
        i. Earth not used as a path.
4. 250.6 Objectionable Current
    a. What is objectionable current
    b. How to stop objectionable currents
5. 250.8 Connection of Grounding and bonding Equipment
    a. Methods Permitted
    b. What not Permitted
        i. Solder only
6. 250.12 Clean Surfaces
7. 250.24 Grounding Service-Supplied Alternating Current Systems 1.25 Hour 9:00-10:15
    a. System Grounding Connections
        i. General Locations
        ii. Outdoor Transformers
        iii. Load Side Connections
    b. Main Bonding Jumper
        i. What shall be connected together by it.
    c. Grounded Conductor Brought to Service Equipment
        i. Sizing for single Raceway
        ii. Sizing for parallel raceways
        iii. Delta Connected Services
        iv. High Impedance
            1. 250.36
    d. Example of calculating Grounded Conductor

8. 250.28 Main Bonding Jumper and Service Bonding Jumper
    a. Material
    b. Construction
    c. Attachment
    d. Sizing
        i. General methods
        ii. Main for more than one Enclosure.
    e. Examples of sizing main bonding jumper

Break 15 min. 10:15 – 10:30

9. 250.30 Separately Derived Systems AC Systems 1.5 Hour 10:30 -12:00 PM
    a. Grounded Systems
        i. System Bonding Jumper
        ii. Supply Side Bonding Jumper
        iii. Grounded Conductor
        iv. Grounding Electrode
        v. Grounding Electrode Conductor, Single system
        vi. Grounding Electrode Conductor for Multiple Systems
10. 250.32 Building or Structures supplied by a Feeder or branch Circuit(s)
11. 250.36 High Impedance Ground Neutral System
    a. What are they?
    b. Where used Mostly

Lunch 45 min. 12:00 – 12:45

12. 250.50 Grounding Electrode System and Grounding Electrode Conductor 1 Hour 12:45 – 1:45
    a. How many electrodes shall be used?
13. 250.52 Grounding Electrodes
    a. Electrodes permitted for Grounding
        i. Metal Underground Water Pipe
        ii. In Ground Support Structures
        iii. Concrete Encased Electrode (ufer)
        iv. Ground Ring
        v. Rod, Pipe
        vi. Other Listed Electrodes
        vii. Plate Electrode
        viii. Other Local Metal Underground Systems
    b. Not permitted for use as an electrode
        i. Gas Piping systems underground
        ii. Aluminum
14. 250.53 Grounding Electrode System Installation
    a. Rod, Pipe
        i. In Moisture
        ii. 8 feet in Ground
        iii. Can be at an angle if rock is hit.
        iv. Supplemental Electrode Required
        v. Supplemental Electrode
            1. 6 feet apart if another rod or pipe.
    b. Plate Electrode
        i. 30 inches in the ground
    c. Metal Underground water pipe
        i. Continuity

ii. Supplemental Electrode Required
d. Electrode conductor wire size
i. #6 or larger
e. Ground Ring Requirements
i. 30 inches deep

15. 250.54 Auxiliary Grounding Electrodes
    a. Not required to meet other Rod electrode requirements
        i. 25 ohms
        ii. Wire size
16. 250.58 Common Electrodes
    a. Must be used if more than one supply into building.
17. 250.64 Aluminum or Copper Clad Aluminum conductors
    a. Not closer than 18 inches to the earth if used.
    b. Secured and Protection of electrode conductors
    c. Continuous
    d. Service with Multiple Disconnecting means
        i. Common Grounding Electrode Conductor and Taps
    e. E Enclosures for grounding electrode Conductors
        i. Bonded on both ends

18. 250.66 Size of AC Grounding Electrodes Conductors — 1 Hour 1:45 – 2:45
    a. Rod and Pipe
    b. Concrete encased
    c. Ground Rings
    d. Sizing Grounding Electrode Conductors

Break — 15 min. 2:45 – 3:00

19. 250.92 Service Bonding — 1 Hour 3:00 – 4:00
    a. Bonding of Equipment for Services
    b. Methods of Bonding at the service
20. 250.94 Bonding of Other Systems
    a. Intersystem bonding Termination
21. 250.97 Bonding for Over 250 Volts
    a. Methods to do so as found in 250.92 B
22. 250.100 Hazardous Locations
23. 250.102 Bonding Conductors and Jumpers
    a. Supply Side
    b. Load Side
    c. Sizing Bonding jumper examples
24. 250.104 Bonding of Piping Systems and Exposed Structural Steel
    a. Metal Water Piping
    b. Building with Multiple Occupancies.
    c. Other Metal Piping
    d. Structural Steel
25. 250.106 Lighting Protection Systems
26. 250.118 Types of Equipment Grounding Conductors
27. 250.119 Identification of Equipment Grounding Conductors
    a. Smaller than a #4
    b. Larger than a # 6

28. 250.122 Size of Equipment Grounding Conductors 1 Hour 4:00 – 5:00
    a. General
    b. Increase in Size
        i. Example of increase of size
    c. Multiple Circuits
    d. Motor Circuits
        i. General
        ii. MCP and Instantaneous Circuit Breakers
            1. Example of motor circuit EGC
    e. Conductors in Parallel
    f. Feeder Taps
        i. Sized from the OCPD ahead of Tap but not larger than Tap Conductors
29. 250.138 Cord and Plug Connected Equipment
    a. By Equipment Grounding Conductor
30. 250.140 Ranges and Clothes Dryers

31. 250.146 Connecting Receptacle Grounding Terminal to Box
    a. Surface Mounted Box
    b. Contact Devices or Yokes
    c. Isolated Receptacles
32. 250.148 Continuity and attachment of Equipment Grounding Conductor to Boxes
    a. Connections
    b. Grounding Continuity
        i. Removal of Device does not stop grounding
33. Article 547 Agricultural Buildings
    a. 547.5 Separate Equipment Grounding Conductor
    b. 547.10 Equipotential Bonding
34. Article 517 Health Care Facilities
    a. 517.13 Grounding of Receptacles and fixed equipment.
    b. 517.14 Bonding of Panelboards
35. Swimming Pools
    a. 680.25 (B) Feeder Grounding
    b. 680.26 B 1 Equipotential Bonding
    c. 680.43 (D) Spa’s and Hot tubs
    d. 680.74 Hydro massage Bathtubs