
BURGLAR & FIRE ALARM
ESTABLISHED 1981
ASSOCIATION OF MICHIGAN
APPRENTICESHIP PROGRAM

BURGLAR & FIRE ALARM ASSOCIATION OF MICHIGAN ESTABLISHED 1981

APPRENTICESHIP PROGRAM

Period 4
Related Training Instruction (RTI)
Module 2 – NFPA 70 National Electrical Code

Reading material associated with this module:
Chapter 2 and Chapter 7
NFPA 70, National Electrical Code, 2023 Edition

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NFPA 70
National Electrical Code
2023 Edition
Chapter 2 – Wiring and Protection

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Article 250 – Grounding and Bonding:

- 250.86 Other Conductor Enclosures and Raceways:
  - Except as permitted by 250.112(I), metal enclosures and raceways for other than service conductors shall be connected to the equipment grounding conductor.
- 250.112(I) Remote-Control, Signaling, and Fire Alarm Circuits.
  - Equipment supplied by Class 1 circuits shall be grounded unless operating at less than 50 volts. Equipment supplied by Class 1 power-limited circuits, by Class 2 and Class 3 remote-control and signaling circuits, and by fire alarm circuits shall be grounded if system grounding is required by Part II or Part VIII of this article.
- *The requirement for grounding a fire alarm system are first based on voltage and then on other conditions. The actual requirement for grounding a system depends on the voltage of the initiating and notifying circuits of the fire alarm system.*

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Article 250 – Grounding and Bonding:

- Part II covers Alternating Current (AC).
- Part VIII covers Direct Current (DC).
  - 250.160 General: Direct-current systems shall comply with Part VIII and other sections of Article 250 not specifically intended for AC systems.
  - 250.162 Direct-Current Circuits and Systems to Be Grounded: Direct-current circuits and systems shall be grounded as provided for in 250.162(A) & (B).
  - 250.162(A) A two-wire DC system supplying premises wiring and operating at greater than 60 volts but not greater than 300 volts shall be grounded.
    - Exception: No. 3: Direct-current fire alarm circuits having a maximum current of 0.030A as specified in Article 760, Part III (Power-Limited Fire Alarm (PLFA) circuits), shall not be required to be grounded.

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Article 250 – Grounding and Bonding:

- *Current fire alarm systems are primarily direct-current (DC) systems that operate at 24V or less and have PLFA (Power-Limited Fire Alarm) power supplies for the initiating device & notification appliance circuits. As indicated in section 250.162, systems that operate at less than 60 volts DC are not required to be grounded. Since the system is not required to be grounded, the raceways, boxes and other enclosures are not required to be grounded.*
- *Note, however, that the fire alarm control panel is likely to be supplied by a 120VAC circuit, which, in compliance with section 250.20(B), requires that the circuit and the fire alarm panel is to be grounded.*
- Informational Note Figure 250.126: One example below of a symbol used to indicate the grounding termination point for an equipment grounding conductor.

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Article 250 – Grounding and Bonding:

- 250.119 Identification of Equipment Grounding Conductors:
  - (A) General: Unless required elsewhere in this Code, equipment grounding conductors shall be permitted to be bare, covered, or insulated. Individually covered or insulated equipment grounding conductors of the wire type shall have a continuous outer finish that is either green or green with one or more yellow stripes. Conductors with insulation or individual covering that is green or green with one or more yellow stripes, or otherwise identified as permitted by this section shall not be used for ungrounded or grounded circuit conductors.
  - Exception No. 1: Power-limited, Class 2 or Class 3 cables, power-limited fire alarm cables, or communications cables containing only circuits operating at less than 50VAC or 60VDC, if connected to equipment not required to be grounded, shall be permitted to use a conductor with green insulation or green with one or more yellow stripes for other than equipment grounding purposes.

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Chapter 7 – Special Conditions

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Article 760 – Fire Alarm Systems:

- *Article 760 includes Part I General, Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits, Part III Power-Limited Fire Alarm (PLFA) Circuits, and Part IV Listing Requirements.*
- Part I General:
  - 760.1 Scope: Article 760 covers the installation of wiring and equipment of fire alarm systems, including all circuits controlled and powered by the fire alarm system.
    - Informational Note 1: Fire alarm systems include fire detection and alarm notification, guard's tour, sprinkler waterflow, and sprinkler supervisory systems. Circuits controlled and powered by the fire alarm system include circuits for the control of building systems safety functions, elevator recall and shutdown, door release, smoke doors and damper control, fire doors and damper control, and fan shutdown, but only where these circuits are **powered by and controlled by** the fire alarm system.
    - Informational Note 2: See NFPA 72, National Fire Alarm and Signaling Code, for additional information on installation and monitoring for integrity requirements of fire alarm systems.

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Article 100 – Definitions:

- Cable, Abandoned:
  - Installed cable that is not terminated at equipment other than a termination fitting or a connector and not identified for future use with a tag.
- Fire Alarm Circuit:
  - The portion of the wiring system between the load side of the overcurrent device or the power-limited supply and the connected equipment of all circuits powered and controlled by the fire alarm system. Fire alarm circuits are classified as either non-power limited (NPLFA) or power limited (PLFA).
- Cable, Circuit Integrity:
  - Cable marked with the suffix "–CI" used for remote-control, signaling, power-limited, fire alarm, optical fiber, or communications systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions.

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Article 760 – Fire Alarm Systems:

- Part I General:
  - 760.3 Other Articles: Circuits and equipment shall comply with 760.3(A) through (O). Only those sections of Article 300 referenced in this article shall apply to fire alarm systems.
    - (A) Spread of Fire or Products of Combustion: Installation of fire alarm cables shall comply 300.21.
    - (B) Ducts, Plenums, and Other Air-Handling Spaces: Fire alarm cables shall comply with 300.22, where installed in ducts, plenums or other spaces used for environmental air.
      - Exception: Where installed in accordance with 722.135 and 300.22(B) Exception, shall be permitted to be installed in ducts specifically fabricated for environmental air.
      - Exception: Where installed in accordance with 722.135, shall be permitted to be installed in other spaces used for environmental air (plenums).

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Article 760 – Fire Alarm Systems:

- Part I General:
  - 760.3 Other Articles: Circuits and equipment shall comply with 760.3(A) through (O) (continued).
    - (C) Corrosive, Damp or Wet Locations: Comply with 110.11, 300.5(B), 300.6, 300.9, and 310.10(F).
    - (D) Building Control Circuits: Comply with Article 725 when building control circuits are associated with the fire alarm system.
    - (E) Optical Fiber Cables: Comply with Article 770 when optical fiber cables are used for fire alarm circuits.
    - (F) Installation of Conductors with Other Systems. Installations shall comply with 300.8.
    - (G) Raceways or Sleeves Exposed to Different Temperatures: Installations shall comply with 300.7A.

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Article 760 – Fire Alarm Systems:

- Part I General:
  - 760.3 Other Articles: Circuits and equipment shall comply with 760.3(A) through (O) (continued).
    - (H) Vertical Support for Fire-Resistive Cables and Conductors: Vertical installations of circuit integrity (CI) cables and conductors installed in a raceway or conductors and cables of fire-resistive cable systems shall be installed in accordance with 300.19.
    - (I) Installation of Cables and Conductors in Raceway: The number and size of cables and conductors shall comply with 300.17.
    - (J) Bushing: A bushing shall be installed where cables emerge from raceway used for mechanical support or protection in accordance with 300.15(C).

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Article 760 – Fire Alarm Systems:

- Part I General:
  - 760.3 Other Articles: Circuits and equipment shall comply with 760.3(A) through (O) (continued).
    - (K) Cable Routing Assemblies: PLFA cables shall be permitted to be installed in plenum cable routing assemblies, and general-purpose cable routing assemblies selected in accordance with Table 800.154(c), listed in accordance with 800.182, and installed in accordance with 800.110(C) and 800.113.
    - (L) Communications Raceways: PLFA cables shall be permitted to be installed in plenum communications raceways, riser communications raceways, and general-purpose communications raceways selected in accordance with Table 800.154(b), listed in accordance with 800.182, and installed in accordance with 800.113 and 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.

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Article 760 – Fire Alarm Systems:

- Part I General:
  - 760.3 Other Articles: Circuits and equipment shall comply with 760.3(A) through (O) (continued).
    - (M) Temperature Limitations of Power-Limited and Non-Power-Limited Fire Alarm Cables: The requirements of 310.14(A)(3) on the temperature limitations of conductors shall apply to PLFA and NPLFA cables.
    - (N) Identification of Equipment Grounding Conductors: Equipment grounding conductors shall be identified in accordance with 250.119.
      - Exception: Conductors with green insulation shall be permitted to be used as ungrounded signal conductors for Types FPLP, FPLR, FPL, and substitute cables installed in accordance with 760.154(A).
    - (O) Cables for Power-Limited Fire Alarm (PLFA) Circuits: The listing and installation of cables for PLFA circuits shall comply with Part III of this article and Parts I and II of Article 722.

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Article 760 – Fire Alarm Systems:

- Part I General:
  - 760.10 Hazardous (Classified) Locations: Cables and equipment shall be permitted to be used in hazardous (classified) locations where specifically permitted by other sections of this Code.
  - *Articles 500 through 516 and 517 Part IV, where installed in hazardous locations.*
  - 760.21 Access to Electrical Equipment Behind Panels Designed to Allow Access: Access to electrical equipment shall not be denied by an accumulation of conductors and cables that prevents removal of panels, including suspended ceiling panels.

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Article 760 – Fire Alarm Systems:

- Part I General:
  - 760.24 Mechanical Execution of Work.
    - (A) General: Fire alarm circuits shall be installed in a neat workmanlike manner. Cables and conductors installed on the surface of ceilings and sidewalls shall be supported by the building structure in a manner that the cable will not be damaged by normal building use. Such cables shall be supported by hardware, including straps, staples, hangers, listed cable ties identified for securement and support, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4 and 300.11.
    - Informational Note: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants might result in an undetermined alteration of PLFA and NPAFA cable properties.

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Article 760 – Fire Alarm Systems:

- Part I General:
  - 760.24 Mechanical Execution of Work.
    - (B) Circuit Integrity (CI) Cable: CI cables shall be supported at a distance not exceeding 24”. Where supported within 7’ of the floor in accordance with 760.53(A)(1) and 760.130(B)(1) as applicable, the cable shall be fastened in an approved manner at intervals of not more than 18”. Cable supports and fasteners shall be steel.
  - 760.25 Abandoned Cables: The accessible portion of abandoned fire alarm cables shall be removed. If tagged for future use, the tag must be able to withstand the environment involved.
  - 760.30 Fire Alarm Circuit Identification: Fire alarm circuits shall be identified at terminal and junction locations to help prevent unintentional signals on fire alarm circuit(s) during testing and servicing of other systems.

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Article 760 – Fire Alarm Systems:

- Part I General:
  - 760.32 Fire Alarm Circuits Extending Beyond One Building: NPFLA & PLFA circuits that extend beyond one building and run outdoors shall meet the installation requirements of Parts II, III, and IV of Article 805 and shall meet the installation requirements of Part I of Article 300.
  - 760.33 Supply-Side Overvoltage Protection: A listed surge-protective device (SPD) shall be installed on the supply side of a fire alarm control panel in accordance with Part II of Article 242.

END OF PERIOD 4 – MODULE 2