BURGLAR & FIRE ALARM ASSOCIATION OF MICHIGAN

ESTABLISHED 1981

APPRENTICESHIP PROGRAM

BURGLAR & FIRE ALARM ASSOCIATION OF MICHIGAN ESTABLISHED 1981

APPRENTICESHIP PROGRAM

Period 4
Related Training Instruction (RTI)
Module 3 – NFPA 70 National Electrical Code

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

BURGLAR & FIRE ALARM ASSOCIATION OF MICHIGAN ESTABLISHED 1981

APPRENTICESHIP PROGRAM

NFPA 70
National Electrical Code
2023 Edition
Chapter 7 – Special Conditions

NFPA 70 National Electrical Code (NEC) 2023 Edition

Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.41(A) The power source for NPLFA circuits shall comply with Chapters 1-4 and the output voltage shall not be greater than 600V, nominal.
  - 760.41(B) Branch Circuit:
    - The branch circuit supplying the fire alarm equipment(s) shall comply with the following:

      (1) The branch circuit shall supply no other loads.

      (2) The branch circuit shall not be supplied through ground-fault or arc-fault circuit interrupters.

      (3) The location of the branch circuit overcurrent protective device shall be permanently identified at the fire alarm control unit.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.41(B) Branch Circuit:
    - The branch circuit supplying the fire alarm equipment(s) shall comply with the following (continued):

      (4) The circuit disconnecting means shall have red identification, shall be accessible only to qualified personnel, and be identified as “FIRE ALARM CIRCUIT”. The red identification shall not damage the overcurrent protective devices or obscure the manufacturer’s markings.

      (5) The fire alarm circuit disconnect shall be permitted to be secured in the “on” position.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.43 NPLFA Circuit Overcurrent Protection:
    - Overcurrent protection for conductors 14 AWG and larger shall be provided in accordance with the conductor ampacity without applying the derating factors of 310.14 to the ampacity calculation. Overcurrent protection shall not exceed 7 amperes for 18 AWG conductors and 10 amperes for 16 AWG conductors.
    - Exception: Where other articles of this Code permit or require other overcurrent protection.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.46 NPLFA Circuit Wiring:
    - Installation of non-power-limited fire alarm circuits must be in accordance with 110.3 (B), 300.7, 300.11, 300.15, 300.17, 300.19(B) and other appropriate articles of Chapter 3.
    - Exception 1: As provided in 760.48 through 760.53.
    - Exception 2: Where other articles of this Code require other methods, e.*g., hazardous (classified) locations*.
    - 110.3(B) Installation and Use: Listed or labeled equipment must be installed and used in accordance with any instructions included in the listing or labeling.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.46 NPLFA Circuit Wiring:
    - 300.7 Raceways Exposed to Different Temperatures:
      - (A) Sealing: If there is a condensation potential the raceway or sleeve shall be filled with an approved material to prevent the circulation of warm air. An explosionproof seal shall not be required for this purpose.
      - (B) Expansion Fittings. Raceways shall be provided with appropriate expansion/deflection fittings where necessary to compensate for thermal expansion, deflection, and contraction.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.46 NPLFA Circuit Wiring:
    - 300.11 Securing and Supporting:
      - (A) Secured in Place. Raceways, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place.
      - (B) Wiring Systems Installed Above Suspended Ceilings: Support wires that do not provide secure support shall not be the sole support. Support wires and associated fittings that provide secure support and that are installed in addition to the ceiling grid support wires shall be permitted as the sole support. Where independent support wires are used, they shall be secured at both ends. Cables and raceways shall not be supported by ceiling grids.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.46 NPLFA Circuit Wiring:
    - 300.11 Securing and Supporting:
      - (B)(1) Wiring Systems Installed Above Suspended Ceilings – Fire-Rated Assemblies: Wiring located within the cavity of a fire-rated floor-ceiling or roof-ceiling assembly shall not be secured to, or supported by, the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided and shall be allowed to be attached to the assembly. Where independent support wires are used, they shall be distinguishable by color, tagging or other effective means from those that are part of the fire-rated design.
      - Exception: The ceiling support system shall be permitted to support wiring and equipment that have been tested as part of the fire-rated assembly.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.46 NPLFA Circuit Wiring:
    - 300.11 Securing and Supporting:
      - (B)(2) Wiring Systems Installed Above Suspended Ceilings – Non-Fire-Rated Assemblies: Wiring located within the cavity of a non-fire-rated floor-ceiling or roof-ceiling assembly shall not be secured to, or supported by, the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided and shall be allowed to be attached to the assembly. Where independent support wires are used, they shall be distinguishable by color, tagging or other effective means.
      - Exception: The ceiling support system shall be permitted to support branch-circuit wiring and associated equipment, where installed in accordance with the ceiling system manufacturer's instructions.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.46 NPLFA Circuit Wiring:
    - 300.15 Boxes, Conduit Bodies, or Fittings – Where Required:
      - Fittings and connectors shall be used only with the specific wiring methods for which they are designed and listed.
      - Where the wiring method is conduit, tubing, or cables, a box or conduit body shall be installed at each outlet point, switch point, conductor splice point, conductor junction point, conductor termination point, or wiring method transition point, or conductor pull point, unless otherwise permitted in 300.15 (A) Through (L).
      - (A) Wiring Methods with Interior Access: A box or conduit body shall not be required for each splice, junction, switch, pull, termination, or outlet points in wiring methods with removeable covers such as wireways, auxiliary gutters, and surface raceways. The covers shall be accessible after installation.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.46 NPLFA Circuit Wiring:
    - 300.15 Boxes, Conduit Bodies, or Fittings – Where Required:
      - (B) Equipment: An integral junction box or wiring compartment as part of approved equipment shall be permitted in lieu of a box.
      - (C) Protection: A box or conduit body shall not be required where cables enter or exit from conduit or tubing that is used to provide cable support or protection against physical damage. A fitting must be provided on the end(s) of the conduit or tubing to protect the cable from abrasion.
      - (F) Fitting: A fitting identified for the use shall be permitted in lieu of a box or conduit body where conductors are not spliced or terminated in the fitting. The fitting shall be accessible after installation, unless listed for concealed installation.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.46 NPLFA Circuit Wiring:
    - 300.17 Number and Size of Conductors and Cables in Raceway:
      - The number and size of conductors and cables in any raceway shall not be more than will permit dissipation of the heat and ready installation or withdrawal of the conductors or cables without damage to the conductors or cables or to their insulation.
    - 300.19(B) Fire-Resistive Cables and Conductors:
      - Support methods and spacing intervals for fire-resistive cables and conductors shall comply with any restrictions provided in the listing of the electrical circuit protective system or fire-resistive cable system used and in no case shall exceed the values in Table 300.19(A), Spacings for Conductor Supports.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.48 Conductors of Different Circuits in Same Cable, Enclosure, or Raceway:
    - (A) Class 1 with NPLFA Circuits: Class 1 and NPLFA circuits shall be permitted to occupy the same cable, enclosure, or raceway without regard to whether the individual circuits are AC or DC, provided all conductors are insulated for the maximum voltage of any conductor in the enclosure or raceway.
    - (B) Fire Alarm with Power Supply Circuits: Power supply and fire alarm circuit conductors shall be permitted in the same cable, enclosure, or raceway only when connected to the same equipment.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.49 NPLFA Circuit Conductors:
    - (B) Insulation: Insulation on conductors shall be rated for the system voltage and not less than 600 volts. Conductors larger than 16 AWG shall comply with Article 310. Conductors of 18 AWG & 16 AWG shall be Type KF-2, KFF-2, PAFF, PTFF, PF, PFF, PGF, PGFF, RFH-2, RFHH-2, RFHH-3, SF-2, SFF-2, TF, TFF, TFN, TFFN, ZF, or ZFF. Conductors with other types and thickness of insulation shall be allowed if listed for NPLFA circuit use.
    - Informational Note: See Table 420.3 for application provisions.
    - (C) Conductor Materials: Conductors shall be solid or stranded copper.
    - Exception to (B) and (C): Wire types PAF and PTF shall be permitted only for high-temperature applications between 194°F and 482°F.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.51 Number of Conductors in Cable Trays and Raceways and Ampacity Adjustment Factors:
    - (A) NPLFA Circuits and Class 1 Circuits. Where only NPLFA circuit and Class 1 circuit conductors are in a raceway, the number of conductors shall be in accordance with 300.17. The ampacity adjustment *(derating)* factors of 310.15(C)(1) shall apply if such conductors carry continuous load in excess of 10% of the ampacity of each conductor.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.51 Number of Conductors in Cable Trays and Raceways and Ampacity Adjustment Factors:
    - (B) Power-Supply Conductors and NPLFA Circuit Conductors: Where power-supply conductors and NPLFA circuit conductors are permitted in a raceway in accordance with 760.48, the number of conductors shall be in accordance with 300.17. The ampacity adjustment *(derating)* factors of 310.15(C)(1) shall apply as follows:
      - (1) To all conductors where the fire alarm circuit conductors carry continuous loads in excess of 10% of the ampacity of each conductor and where the total number of conductors is more than three.
      - (2) To the power-supply conductors only, where the fire alarm circuit conductors do not carry continuous loads in excess of 10% of the ampacity of each conductor and where the number of power-supply conductors is more than 3.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.51 Number of Conductors in Cable Trays and Raceways and Ampacity Adjustment Factors:
    - (C) Cable Trays. Where fire alarm circuit conductors are installed in cable trays, they shall comply with 392.22 and 392.80(A).

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.53 Multiconductor NPLFA Cables:
    - Multiconductor NPLFA cables that meet the *(listing)* requirements of 760.176 shall be permitted to be used on fire alarm circuits operating at 150 volts or less and shall be installed in accordance with 760.53(A) and (B).
    - (A) NPLFA Wiring Method: Multiconductor NPLFA circuit cables shall be installed in accordance with 760.53(A)(1), (A)(2), and (A)(3).
      - (1) In Raceways, Exposed on Ceilings or Sidewalls, or Fished in Concealed Spaces: Cable splices or terminations shall be made in listed fittings, boxes, enclosures, fire alarm devices, or utilization equipment. Where installed exposed, cables shall be adequately supported and installed in such a way that maximum protection against physical damage is afforded by building construction. Where located within 7 feet of the floor, cables shall be securely fastened at intervals of not more than 18 inches.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.53 Multiconductor NPLFA Cables:
    - (A) NPLFA Wiring Method: Multiconductor NPLFA circuit cables shall be installed in accordance with 760.53(A)(1), (A)(2), and (A)(3).
      - (2) Passing Through a Floor or Wall: In metal raceways or rigid nonmetallic conduit where passing through a floor or wall to a height of 7 feet above the floor, unless adequate protection can be afforded by building construction, *e.g., baseboards, door frames, ledges, and so forth*, or unless an equivalent solid guard is provided.
      - (3) In Hoistways: In rigid metal conduit (RMC), rigid nonmetallic conduit (PVC, RTRC), intermediate metal conduit (IMC), liquidtight flexible nonmetallic conduit (LFNC), or electrical metallic tubing (EMT) where installed in hoistways.
        - Exception: As provided for in 620.21 for elevators and similar equipment.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.53 Multiconductor NPLFA Cables:
    - (B) Applications of Listed NPLFA Cables: The use of NPLFA circuit cables shall comply with 760.53(B)(1) through (B)(4).
      - (1) Ducts: Multiconductor NPLFA circuit cables, Types NPLFP, NPLFR, and NPLF, shall not be installed exposed in ducts specifically fabricated for environmental air.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.53 Multiconductor NPLFA Cables:
    - (B) Applications of Listed NPLFA Cables: The use of NPLFA circuit cables shall comply with 760.53(B)(1) through (B)(4) (continued).
      - (2) Other Spaces Used for Environmental Air: Cables installed in other spaces used for environmental air *(plenums)* shall be Type NPLFP (NPLF Plenum).
        - Exception 1: Types NPLR (NPLF Riser and NPLF General Purpose) installed in compliance with 300.22(C)
        - Exception 2: Other wiring methods in accordance with 300.22(C) and conductors in compliance with 760.49(C)
        - Exception 3: Type NPLFP-CI cable shall be permitted to be installed to provide a 2-hour rated circuit integrity rated cable.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.53 Multiconductor NPLFA Cables:
    - (B) Applications of Listed NPLFA Cables: The use of NPLFA circuit cables shall comply with 760.53(B)(1) through (B)(4) (continued).
      - (3) Riser: Cables installed in vertical runs and penetrating one or more floors or cables installed in vertical runs in a shaft shall be Type NPLFR. Floor penetrations requiring Type NPLFR shall contain only cables suitable for riser or plenum use.
        - Exception 1: Types NPLF or other cables specified in Chapter 3 in compliance with 760.49(C) and encased in metal raceway.
        - Exception 2: Type NPLF cables located in a fireproof shaft having firestops at each floor.
        - Exception 3: Type NPLFR-CI cable shall be permitted to be installed to provide a 2-hour rated circuit integrity rated cable.

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Article 760 – Fire Alarm Systems:

- Part II Non-Power-Limited Fire Alarm (NPLFA) Circuits:
  - 760.53 Multiconductor NPLFA Cables:
    - (B) Applications of Listed NPLFA Cables: The use of NPLFA circuit cables shall comply with 760.53(B)(1) through (B)(4) (continued).
      - (4) Other Wiring Within Buildings: Cables installed in building locations other than the locations covered in 760.53(B)(1), (B)(2), and (B)(3) shall be Type NPLF.
        - Exception 1: Chapter 3 wiring methods with conductors in compliance with 760.49(C).
        - Exception 2: Type NPLFP or NPLFR cables shall be permitted.
        - Exception 3: Type NPLF-CI cable shall be permitted to be installed to provide a 2-hour rated circuit integrity rated cable.

END OF PERIOD 4 – MODULE 3