
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 4 – 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

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.121(A) Power Source: The power source for PLFA circuits shall be as specified in the following *(Refer to Article 725 for information on Class 3 power supplies and transformers)*:
    - (1) A listed PLFA or Class 3 transformer.
    - (2) A listed PLFA or Class 3 power supply.
    - (3) Listed equipment marked to identify the PLFA power source.
  - Informational Note 1: See Chapter 9, Tables 12(A) and 12(B) for the listing requirements for PLFA circuit sources.
  - Informational Note 2: Examples of listed equipment are a fire alarm control panel with integral power source; a circuit card listed for use as a PLFA source, where used as part of a listed assembly; a current-limiting impedance, listed for the purpose or part of a listed product, used in conjunction with a non-power-limited transformer or a stored energy source, for example, storage battery, to limit the output current.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.121(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 III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.121(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 III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.124 Circuit Marking:
    - The equipment supplying PLFA circuits shall be durably marked where plainly visible to indicate each circuit that is a power-limited fire alarm circuit.
  - 760.127 Wiring Methods on Supply Side of the PLFA Power Source:
    - Conductors and equipment on the supply side of the power source shall be installed in accordance with the appropriate requirements of Part II and Chapters 1 through 4. Transformers or other devices supplied from power-supply conductors shall be protected by an overcurrent device rated not over 20 amperes.
    - Exception: The input leads of a transformer or other power source supplying PLFA circuits shall be permitted to be smaller than 14 AWG, but not smaller than 18 AWG, if they are not over 12” long and if they have insulation that complies with 760.49(B).

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.130 Wiring Methods and Materials on Load Side of the PLFA Power Source:
    - Fire alarm circuits on the load side of the power source shall be permitted to be installed using wiring methods and materials in accordance with 760.130(A), (B), or a combination of both. Parts I and II of Article 722 *Cables for Power-Limited Circuits and Fault-Managed Power Circuits*, shall apply.
    - (A) NPLFA Wiring Methods and Materials: NPLFA wiring methods shall be permitted in accordance with 760.46, 760.49, or 760.53 for PLFA circuits. Conductors shall be solid or stranded copper. Separation from electric light, power, Class 1, non-power-limited fire alarm circuit conductors, and medium-power network-powered broadband communications cables shall comply with 760.136.
    - Exception: The ampacity adjustment factors specified in 310.15(C)(1) shall not apply.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.130 Wiring Methods and Materials on Load Side of the PLFA Power Source:
    - (B) PLFA Wiring Methods and Materials: PLFA conductors and cables described in 722.179 shall be installed as detailed in 722.135 and 760.130(B)(1) through (B)(4). Devices shall be installed in accordance with 110.3(B), 300.11(A), and 300.15.
    - (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 III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.130 Wiring Methods and Materials on Load Side of the PLFA Power Source:
    - (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) Nonconcealed Spaces: Cables specified in Chapter 3 and meeting the requirements of 722.179(A)(15)(a) and (A)(15)(b) shall be permitted to be installed in nonconcealed spaces where the exposed length of cable does not exceed 10'.
    - (4) Portable Fire Alarm Systems: A portable fire alarm system provided to protect a stage or set when not in use shall be permitted to use wiring methods in accordance with 530.12.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.130 Wiring Methods and Materials on Load Side of the PLFA Power Source:
    - 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.
    - 300.11(A) Secured in Place: Raceways, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place.
    - 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).

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.130 Wiring Methods and Materials on Load Side of the PLFA Power Source:
    - 300.15 Boxes, Conduit Bodies, or Fittings – Where Required:
      - (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.
      - (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.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.130 Wiring Methods and Materials on Load Side of the PLFA Power Source:
    - 300.15 Boxes, Conduit Bodies, or Fittings – Where Required:
      - (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 III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.133 Installation of Conductors and Equipment in Cables, Compartments, Cable Trays, Enclosures, Manholes, Outlet Boxes, Device Boxes, Raceways, and Cable Routing Assemblies for Power-Limited Fire Alarm Circuits:
    - Conductors and equipment for power-limited fire alarm circuits shall be installed in accordance with Parts I and II of Article 722 and 760.136 through 760.143.
  - 760.136 Separation from Electric Light, Power, Class 1, NPLFA, and Medium-Power Network-Powered Broadband Communications Circuit Conductors:
    - (A) General: PLFA circuit cables and conductors shall not be placed in any cable, cable tray, compartment, enclosure, manhole, outlet box, device box, raceway, or similar fitting with conductors of electric light, power, Class 1, non-power-limited fire alarm circuits and medium-power network-powered broadband communications circuits unless permitted by 760.136(B) through (G).

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.136 Separation from Electric Light, Power, Class 1, NPLFA, and Medium-Power Network-Powered Broadband Communications Circuit Conductors (continued):
    - (B) Separated by Barriers: PLFA circuit cables and conductors shall be permitted to be installed together with Class 1, non-power-limited fire alarm circuits and medium-power network-powered broadband communications circuits where they are separated by a barrier.
    - (C) Raceways Within Enclosures: In enclosures, PLFA circuits shall be permitted to be installed in a raceway within the enclosure to separate them from Class 1, non-power-limited fire alarm circuits and medium-power network-powered broadband communications circuits.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.136 Separation from Electric Light, Power, Class 1, NPLFA, and Medium-Power Network-Powered Broadband Communications Circuit Conductors (continued):
    - (D) Associated Systems Within Enclosures: PLFA conductors in compartments, enclosures, outlet boxes, device boxes or similar fittings shall be permitted to be installed with electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are introduced solely to connect the equipment connected to power-limited fire alarm circuits and shall comply with either of the following conditions:
      - (1) The electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuit conductors are routed to maintain a minimum of ¼" separation from the conductors and cables of power-limited fire alarm circuits.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.136 Separation from Electric Light, Power, Class 1, NPLFA, and Medium-Power Network-Powered Broadband Communications Circuit Conductors (continued):
    - (2) The circuit conductors operate at 150 volts or less to ground and also comply with one of the following:
      - (a) The fire alarm power-limited circuits are installed using Type FPL, FPLR, FPLP, or permitted substitute cables, provided these power-limited cable conductors extending beyond the jacket are separated by a minimum of ¼" or by a nonconductive sleeve or nonconductive barrier from all other conductors.
      - (b) The power-limited fire alarm circuit conductors are installed as non–power-limited circuits in accordance with 760.46.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.136 Separation from Electric Light, Power, Class 1, NPLFA, and Medium-Power Network-Powered Broadband Communications Circuit Conductors (continued):
    - (E) Enclosures with Single Opening: PLFA circuit conductors entering compartments, enclosures, outlet boxes, device boxes or similar fittings shall be permitted to be installed with electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are introduced solely to connect the equipment connected to power-limited fire alarm circuits or to other circuits controlled by the fire alarm system to which the other conductors in the enclosure are connected. Where PLFA circuit conductors must enter an enclosure that is provided with a single opening, they shall be permitted to enter through a single fitting (such as a tee), provided the conductors are separated from the conductors of the other circuits by a continuous and firmly fixed nonconductor, such as flexible tubing.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.136 Separation from Electric Light, Power, Class 1, NPLFA, and Medium-Power Network-Powered Broadband Communications Circuit Conductors (continued):
    - (F) In Hoistways: In hoistways, PLFA circuit conductors shall be installed in rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit or electrical metallic tubing. For elevators or similar equipment, these conductors shall be permitted to be installed as provided in 620.21.
    - (G) Where Protected: PLFA circuits shall be permitted to be installed together with the conductors of electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are installed using NPLFA wiring methods and materials in accordance with Part II of Article 760 and are protected by an approved method.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.136 Separation from Electric Light, Power, Class 1, NPLFA, and Medium-Power Network-Powered Broadband Communications Circuit Conductors (continued):
    - (H) Other Applications: For other applications, PLFA circuit conductors shall be separated by at least 2” from conductors of electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuits unless one of the following conditions is met:
      - (1) Either (a) all of the electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuit conductors or (b) all of the power-limited fire alarm circuit conductors are in a raceway or in metal-sheathed, metal-clad, nonmetallic-sheathed, or Type UF cables.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.136 Separation from Electric Light, Power, Class 1, NPLFA, and Medium-Power Network-Powered Broadband Communications Circuit Conductors (continued):
    - (2) All of the electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuit conductors are permanently separated from all of the power-limited fire alarm circuit conductors by a continuous and firmly fixed nonconductor, such as porcelain tubes or flexible tubing, in addition to the insulation on the conductors.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.139 Installation of Conductors of Different PLFA Circuits, Class 2, Class 3, and Communications Circuits in the Same Cable, Enclosure, Cable Tray, Raceway, or Cable Routing Assembly:
    - (A) Two or More PLFA Circuits: Cable and conductors of two or more power-limited fire alarm circuits shall be permitted within the same cable, enclosure, cable tray, raceway, or cable routing assembly.
    - (B) Class 2 Circuits with PLFA Circuits: Conductors of one or more Class 2 circuits shall be permitted within the same cable, enclosure, cable tray, or raceway, or cable routing assembly with conductors of power-limited fire alarm circuits if the insulation of the Class 2 circuit conductors in the cable, enclosure, raceway, or cable routing assembly is at least that required by the power-limited fire alarm circuits.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.139 Installation of Conductors of Different PLFA Circuits, Class 2, Class 3, and Communications Circuits in the Same Cable, Enclosure, Cable Tray, Raceway, or Cable Routing Assembly (continued):
    - (C) Class 3 and Communications Circuits with PLFA Circuits: Cable and conductors of Class 3 and communications circuits shall be permitted within the same cable, enclosure, cable tray, or raceway, or cable routing assembly with cables and conductors of PLFA circuits.
    - (D) Low-Power Network-Powered Broadband Communications Cables and PLFA Cables: Low-power network-powered broadband communications circuits shall be permitted in the same enclosure, cable tray, raceway, or cable routing assembly with PLFA cables.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.139 Installation of Conductors of Different PLFA Circuits, Class 2, Class 3, and Communications Circuits in the Same Cable, Enclosure, Cable Tray, Raceway, or Cable Routing Assembly (continued):
    - (E) Audio System Circuits and PLFA Circuits: Audio system circuits described in 640.9(C) and installed using Class 2 or Class 3 wiring methods in compliance with 722.135 shall not be installed in the same cable, cable tray, raceway, or cable routing assembly with power-limited conductors or cables.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.142 Conductor Size: Conductors of 26 AWG shall be permitted only where spliced with a connector listed as suitable for 26 AWG to 24 AWG or larger conductors that are terminated on equipment or where the 26 AWG conductors are terminated on equipment listed as suitable for 26 AWG conductors. Single conductors shall not be smaller than 18 AWG.
  - 760.143 Support of Conductors: PLFA circuit conductors shall not be strapped, taped, or attached by any means to the exterior of any conduit or other raceway as a means of support.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.145 Current-Carrying Continuous Line-Type Fire Detectors:
    - (A) Application: Listed continuous line-type fire detectors, including insulated copper tubing of pneumatically operated detectors, employed for both detection and carrying signaling currents shall be permitted to be used in power-limited circuits.
    - (B) Installation: Continuous line-type fire detectors shall be installed in accordance with 760.124 through 760.130 and 760.133.

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Article 760 – Fire Alarm Systems:

- Part III Power-Limited Fire Alarm (PLFA) Circuits:
  - 760.154 Applications of Listed PLFA Cables: PLFA cables shall comply with the requirements described in Table 760.154 or where cable substitutions are made as shown in 760.154(A). Where substitute cables are installed the wiring requirements of Article 760, Parts I and III, shall apply. Types FPLP-CI, FPLR-CI, AND FPL-CI cables shall be permitted to be installed to provide 2-hour circuit integrity rated cables.
  - (A) Fire Alarm Cable Substitutions: The substitutions for fire alarm cables listed in Table 760.154 (A) shall be permitted. Where substitute cables are installed, the wiring requirements of Article 760, Parts I and III, shall apply.

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Article 760 – Fire Alarm Systems:

- Part IV Listing Requirements:
  - 760.176 Listing and Marking of NPLFA Cables: NPLFA cables installed as wiring within buildings shall be listed in accordance with 760.176(A) and (B), be listed as being resistant to the spread of fire in accordance with 760.176(C) through (F) and be marked in accordance with 760.176(G). Cable used in a wet location shall be listed for use in wet locations or have a moisture-impervious metal sheath. NPLFA cables shall have a temperature rating of not less than 60°C (140°F). NPLFA cables shall be permitted to contain optical fibers.
    - (A) NPLFA Conductor Materials: Conductors shall be 18 AWG or larger solid or stranded copper.
    - (B) Insulated Conductors: Insulation on conductors shall be rated for the system voltage and not less than 600V. Insulated conductors 14 AWG and larger shall be one of the types listed in Table 310.4(1) or one that is identified for such use. Insulated conductors 18 AWG and 16 AWG shall be in accordance with 760.49.

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Article 760 – Fire Alarm Systems:

- Part IV Listing Requirements:
  - (C) Type NPLFP: Type NPLFP non–power-limited fire alarm cable for use in other space used for environmental air shall be listed as being suitable for use in other space used for environmental air as described in 300.22(C) and shall also be listed as having adequate fire-resistant and low smoke–producing characteristics.
  - (D) Type NPLFR: Type NPLFR non–power-limited fire alarm riser cable shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.
  - (E) Type NPLF: Type NPLF non–power-limited fire alarm cable shall be listed as being suitable for general-purpose fire alarm use, with the exception of risers, ducts, plenums, and other space used for environmental air, and shall also be listed as being resistant to the spread of fire.

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Article 760 – Fire Alarm Systems:

- Part IV Listing Requirements:
  - (F) Circuit Integrity (CI) Cable, Fire-Resistive Cable System, or Electrical Circuit Protective System: Cables that are used for survivability of critical circuits under fire conditions shall meet either 760.176(F)(1), (F)(2), or (F)(3).
  - Informational Note: See NFPA 72, *National Fire Alarm and Signaling Code*, Sections 12.4.3, 12.4.4, and 12.4.5 for additional information on CI cable, fire-resistive cable systems, or electrical circuit protective systems used for fire alarm circuits to comply with the survivability requirements to maintain the circuit's electrical function during fire conditions for a defined period of time.
  - (F)(1) Circuit Integrity (CI) Cables: Circuit integrity cables specified in 760.176 (C), (D), and (E) and used for survivability of critical circuits shall be marked for an additional classification using the suffix "-CI." In order to maintain its listed fire-resistive rating, CI cables shall only be installed in free air in accordance with 760.24(B).

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Article 760 – Fire Alarm Systems:

- Part IV Listing Requirements:
  - (F)(1) Circuit Integrity (CI) Cables (continued): CI cables shall only be permitted to be installed in a raceway where specifically listed and marked as part of a fire-resistive cable system as covered in 760.176(F)(2). CI cables shall only be permitted to be installed in a raceway where specifically listed and marked as part of an electrical circuit protective system as covered in 760.176(F)(3).
  - (F)(2) Fire-Resistive Cable Systems: Cables specified in 760.176(C), (D), (E) and (F)(1), that are part of a fire-resistive cable system shall be identified with the system identifier and hourly rating marked on the protectant or the smallest unit container and installed in accordance with the listing of the system.
  - (F)(3) Electrical Circuit Protective System: Protectants for cables specified in 760.176(C), (D), and (E), that are part of an electrical circuit protective system, shall be identified with the protective system identifier and hourly rating marked on the protectant or the smallest unit container and installed in accordance with the listing of the protective system.

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Article 760 – Fire Alarm Systems:

- Part IV Listing Requirements:
    - (G) NPLFA Cable Markings: Multiconductor NPLFA cables shall be marked in accordance with Table 760.176(G). NPLFA circuit cables shall be permitted to be marked with a maximum usage voltage rating of 150V. Cable that are listed for circuit integrity shall be identified with the suffix "-CI" as defined in 760.176(F). The temperature rating shall be marked on the jacket of NPLFA cables that have a temperature rating exceeding 60°C (140°F). The jacket of NPLFA cables shall be marked with the conductor size.
    - Informational Note: Cable types are listed in descending order of fire performance.

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Article 760 – Fire Alarm Systems:

- Part IV Listing Requirements:
  - 760.179 Listing and Marking of Insulated Continuous Line-Type Fire Detectors: Insulated continuous line-type fire detectors shall be listed in accordance with 760.179(A) through (D). Cable used in a wet location shall be listed for use in wet locations or have a moisture-impervious metal sheath.
  - (A) Listing: The cable shall be listed as being resistant to the spread of fire in accordance with 722.179(A)(1), (A)(2), and (A)(3).
  - (B) Voltage and Temperature Rating: The cable shall have a voltage rating of not less than 300V. The cable shall have a temperature rating of not less than 60°C (140°F).

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Article 760 – Fire Alarm Systems:

- Part IV Listing Requirements:
  - (C) Markings: The cable shall be marked as fire resistance Type FPLP, FPLR, or FPL in accordance with 722.179(B). The voltage rating shall not be marked on the cable. The temperature rating shall be marked on the jacket of cables having a temperature rating exceeding 60°C (140°F). The jacket of PLFA cables shall be marked with the conductor size.
  - Informational Note: Voltage ratings on cables might be misinterpreted to suggest that the cables could be suitable for Class 1, electric light, and power applications.
  - (D) Cable Jacket Compound: The cable jacket compound shall have a high degree of abrasion resistance.

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Article 722 – Cables for Power-Limited Circuits and Fault-Managed Power Circuits:

- Part I – General:
  - 722.1 Scope: This article covers the general requirements for the installation of single- and multiple-conductor cables used in Class 2 and Class 3 power-limited circuits, power-limited fire alarm (PLFA) circuits, and Class 4 fault-managed power circuits.
  - *Article 760 (PLFA only) requires conformance with Parts I and II of Article 722, as well as the following specifically referenced sections: 722.135, 722.179, 722.179(A)(15)(a), and 722.179(A)(15)(b).*
  - *Where requirements in Article 722 Parts I and II match requirements contained in Article 760 Parts I or III they will not be repeated.*

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Article 722 – Cables for Power-Limited Circuits and Fault-Managed Power Circuits:

- Part I – General:
  - 722.3 (A) Installation of Cables and Conductors in Raceway: The number and size of conductors and cables, **as well as raceway sizing,** shall comply with 300.17
  - 722.3 (D) Cables in Ducts for Dust, Loose Stock, or Vapor Removal: Section 300.22(A) for the wiring systems shall apply.
    - Exception: Nonconductive optical fiber cables shall be permitted in these ducts.
  - 722.3 (E) Cable Trays: Cable tray installations shall comply with Parts I and II of Article 392.
  - 722.3 (I) Installation of Cables with Other Systems: Section 300.8 shall apply.
    - Section 300.8 Raceways or cable trays containing electrical conductors shall not contain any pipe, tube, or equal for steam, water, air, gas, drainage, or any service other than electrical.

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Article 722 – Cables for Power-Limited Circuits and Fault-Managed Power Circuits:

- Part I – General:
  - 722.24 (A) General: Nonmetallic cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release rates in accordance with 300.22(C).
  - 722.24(B) Support of Cables: Cables shall not be strapped, taped, or attached by any means to the exterior of any conduit or other raceway as a means of support.
  - 722.24(C) Circuit Integrity (CI) Cable: Circuit integrity (CI) cable shall be supported at a distance not exceeding 24”. **Cable shall be secured to the noncombustible surface of the building structure.** Cable supports and fasteners shall be steel.

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Article 722 – Cables for Power-Limited Circuits and Fault-Managed Power Circuits:

- Part I – General:
  - 722.135 Installation of Cables: The installation of cables shall comply with 722.135(A) through 722.135(I), as applicable.
    - (A) Listing: Cables installed in buildings shall be listed.
    - (B) Cables in Buildings: The installation of cables shall comply with Table 722.135(B).
    - (E) Cable Substitutions: The substitutions for cables listed in Tabe 722.135(E) shall be permitted. Where substitute cables are installed, they must meet the requirements of Part III (PLFA Circuits) of Article 760.
      - *Cables that are listed as substitutions for fire power-limited cables are limited to the following:*
        - *FPLP → CMP*
        - *FPLR → CMP, FPLP, CMR*
        - *FPL → CMP, FPLP, CMR, FPLR, CMG, CM*

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Article 722 – Cables for Power-Limited Circuits and Fault-Managed Power Circuits:

- Part I – General:
  - 722.135 Installation of Cables: The installation of cables shall comply with 722.135(A) through 722.135(I), as applicable.
    - (F) Circuit Integrity (CI) Cable, Fire-Resistive Cable System, or Electrical Circuit Protective System: CI cable, a fire-resistive cable system, or a listed electrical circuit protective system shall be permitted for use in systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions.

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Article 722 – Cables for Power-Limited Circuits and Fault-Managed Power Circuits:

- Part I – General:
  - 722.135 Installation of Cables: The installation of cables shall comply with 722.135(A) through 722.135(I), as applicable.
    - (I) Installation of Circuit Conductors Extending Beyond One Building: Circuit conductors that extend beyond one building and are run such that they are subject to accidental contact with electric light or power conductors operating over 300 volts to ground, or are exposed to lightning on interbuilding circuits on the same premises, shall comply with the following:
      - For other than coaxial conductors, 800.44, 800.53, 800.100, 805.50, 805.93, 805.170(A), and 805.170(B).
      - For coaxial conductors, 800.44, 820.93. 820.100.
      - The installation requirements of Part I of Article 300.

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Article 722 – Cables for Power-Limited Circuits and Fault-Managed Power Circuits:

- Part II – Listing Requirements:
  - 722.179 Listing and Marking of Cables: Cables installed in buildings shall be listed in accordance with 722.179(A) and marked in accordance with 722.179(B), and they shall be permitted to be marked in accordance with 722.179(C).
  - Exception: Optical fiber cables that are installed in compliance with 770.48 shall not be required to be listed.
  - (A) Listing of Cables: Cables installed as wiring methods within buildings shall be listed as resistant to the spread of fire and other criteria in accordance with 722.179(A)(1) through (A)(16).
  - (1) Plenum Cable: Plenum cable shall be listed as suitable for use in ducts, plenums, and other space for environmental air and shall be listed as having adequate fire-resistant and low-smoke producing characteristics. Refer to Table 722.179(B) for plenum cable types.

NFPA 70 National Electrical Code (NEC) 2023 Edition

Article 722 – Cables for Power-Limited Circuits and Fault-Managed Power Circuits:

- Part II – Listing Requirements:
  - (A) Listing of Cables: Cables installed as wiring methods within buildings shall be listed as resistant to the spread of fire and other criteria in accordance with 722.179(A)(1) through (A)(16) (continued).
  - (2) Riser Cable: Riser cable shall be listed as suitable for use in a vertical run in a shaft or from floor to floor and shall be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.
  - (3) General-Purpose Cable: General-purpose cable shall be listed as resistant to the spread of fire and as suitable for general-purpose use, except for use in risers, ducts, plenums, and other space used for environmental air.
  - (4) Alternative General-Purpose Cable: Alternative general-purpose optical fiber cable shall be listed as suitable for general-purpose use, with the exception of risers and plenums, and shall also be resistant to the spread of fire.

NFPA 70 National Electrical Code (NEC) 2023 Edition

Article 722 – Cables for Power-Limited Circuits and Fault-Managed Power Circuits:

- Part II – Listing Requirements:
  - (7) Circuit Integrity (CI) Cable, Fire-Resistive Cable System, or Electrical Circuit Protective System: Cables that are used for survivability of critical circuits under fire conditions shall meet either 722.179(A)(7)(a), (A)(7)(b), or (A)(7)(c).
  - Informational Note: See NFPA 72, *National Fire Alarm and Signaling Code*, Sections 12.4.3, 12.4.4, and 12.4.5 for additional information on CI cable, fire-resistive cable systems, or electrical circuit protective systems used for fire alarm circuits to comply with the survivability requirements to maintain the circuit's electrical function during fire conditions for a defined period of time.
  - (A)(1)(a) Circuit Integrity (CI) Cables: CI cables specified in 722.179(A)(1), (A)(2), (A)(3), (A)(4), and (A)(6) and used for survivability of critical circuits shall be marked with the additional classification using the suffix "-CI." In order to maintain its listed fire-resistive rating, CI cables shall only be installed in free air in accordance with 722.4(C).

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Article 722 – Cables for Power-Limited Circuits and Fault-Managed Power Circuits:

- Part II – Listing Requirements:
  - (A)(1)(a) Circuit Integrity (CI) Cables (continued): CI cables shall only be permitted to be installed in a raceway where specifically listed and marked as part of a fire-resistive cable system as covered in 760.179(A)(7)(b).
  - (A)(1)(b) Fire-Resistive Cables: Fire-resistive cables of the types specified in 722.179(A)(1), (A)(2), (A)(3), (A)(4), and (A)(6), that are part of a fire-resistive cable system shall be identified with the system identifier and hourly rating marked on the protectant or the smallest unit container and installed in accordance with the listing of the system.
  - (A)(1)(c) Electrical Circuit Protective System: Protectants for cables specified in 722.179(A)(1), (A)(2), (A)(3), (A)(4), and (A)(6), that are part of an electrical circuit protective system, shall be identified with the protective system identifier and hourly rating marked on the protectant or the smallest unit container and installed in accordance with the listing of the protective system.

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Article 722 – Cables for Power-Limited Circuits and Fault-Managed Power Circuits:

- Part II – Listing Requirements:
  - (15) Power-Limited Fire Alarm (PLFA) Cables: PLFA cables shall comply with the following:
    - (a) Conductors for cables, other than coaxial cables shall be solid or stranded copper. Coaxial cables shall be permitted to use 30% conductivity copper-covered steel center conductor wire.
    - (b) The size of conductors in a multi-conductor cable shall not be smaller than 26 AWG. Conductors of 26 AWG shall be permitted only where spliced with a connector listed as suitable for 26 AWG to 24 AWG or larger conductors that are terminated on equipment or where the 26 AWG conductors are terminated on equipment listed as suitable for 26 AWG conductors.
    - (c) Cable shall have a voltage rating of not less than 300 volts.
    - (d) Cables shall have a temperature rating of not less than 60°C (140°F).

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Article 722 – Cables for Power-Limited Circuits and Fault-Managed Power Circuits:

- Part II – Listing Requirements:
  - (B) Marking: Cables shall be durably marked on the surface in accordance with the following:
    - (1) The AWG size or circular mil area shall be repeated at intervals not exceeding 24”.
    - (2) All other markings shall be repeated at intervals not exceeding 40”.
    - (3) The proper type designation for the type of cable shall be marked in accordance with Table 722.179B.
    - (4) The manufacturer’s name, trademark, or other distinctive marking by which the organization responsible for the product can be readily identified shall be marked.
    - (5) The AWG size or circular mil area shall be marked.
    - (6) The temperature rating for a temperature rating exceeding 60°C (140°F) shall be marked.
    - Voltage ratings shall not be marked on the cable.

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Article 722 – Cables for Power-Limited Circuits and Fault-Managed Power Circuits:

- Part II – Listing Requirements:
  - (C) Optional Markings: Cables shall be permitted to be surface marked to indicate special characteristics of the cable materials, *e.g., limited smoke, halogen free, sunlight resistant*.

NFPA 70 National Electrical Code (NEC) 2023 Edition

Article 770 – Optical Fiber Cables:

- Part I – General:
  - Article 100 Definitions:
    - Cable, Optical Fiber: A factory assembly or field assembly of one or more optical fibers having an overall covering.
    - Cable, Optical Fiber, Conductive: A factory assembly of one or more optical fibers having an overall covering and containing non-current-carrying conductive member(s) such as metallic strength member(s), metallic vapor barrier(s), metallic armor, or metallic sheath.
    - Cable, Optical Fiber, Hybrid: A cable containing optical fibers and current-carrying electrical conductors.
    - Cable, Optical Fiber, Nonconductive: A factory assembly of one or more optical fibers having an overall covering and containing no electrically conductive materials.

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Article 770 – Optical Fiber Cables:

- Part I – General:
  - Article 100 Definitions:
    - Cable, Optical Fiber, Protected: Optical fiber cable protected from releasing optical radiation into the atmosphere during normal operating conditions and foreseeable malfunctions by additional armoring, conduit, cable tray, or raceway.
    - Cable Sheath: A single or multiple layers of a protective covering that holds and protects the conductors or optical fibers, or both, contained inside.
    - Exposed (Optical Fiber Cable Exposed to Accidental Contact): A conductive optical fiber cable in such a position that, in case of failure of supports or insulation, contact between the cable's non–current-carrying conductive members and an electrical circuit might result.

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Article 770 – Optical Fiber Cables:

- Part I – General:
  - Article 100 Definitions:
    - Point of Entrance: The point within a building at which the wire or cable emerges from an external wall, from the roof, or from a concrete floor slab., or from a rigid metal conduit (Type RMC) or an intermediate metal conduit (Type IMC).

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Article 770 – Optical Fiber Cables:

- Part I – General:
  - 770.1 Scope. The article covers the installation of optical fiber cables. This article does not cover the construction of optical fiber cables.
  - 770.3 Other Articles: Installations of optical fiber cables shall comply with 770.3(A) through (D). Only those sections of Chapter 2 *(Wiring and Protection)*, and Article 300 referenced in this article shall apply to optical fiber cables.
  - (A) Hazardous (Classified) Locations: Listed optical fiber cables shall be permitted to be installed in hazardous (classified) locations. The cables shall be sealed in accordance with 501.15, 502.15, 505.16, or 506.16, as applicable.
  - (B) Cables in Ducts for Dust, Loose Stock, or Vapor Removal: The requirements of 300.22(A) for wiring systems shall apply to conductive optical fiber cables.

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Article 770 – Optical Fiber Cables:

- Part I – General:
  - (C) Hybrid Cables: Hybrid optical fiber cables shall be classified as electrical cables in accordance with the type of electrical conductors. They shall be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable.
  - (D) Vertical Support for Fire-Resistive Cables: Vertical installations of circuit-integrity (CI) cables installed in a raceway or cables of fire-resistive cable systems shall be installed in accordance with their listing.

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Article 770 – Optical Fiber Cables:

- Part I – General:
  - 770.21 Access to Electrical Equipment Behind Panels Designed to Allow Access: Access to electrical equipment shall not be denied by an accumulation of optical fiber cables that prevents removal of panels, including suspended ceiling panels.
  - 770.24 Mechanical Execution of Work: Optical fiber cables shall be installed in a neat and workmanlike manner. Cables installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4 and 300.11. Plenum cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release rates in accordance with 800.170.

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Article 770 – Optical Fiber Cables:

- Part I – General:
  - 770.25 Abandoned Cables: The accessible portion of abandoned optical fiber cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved.
  - 770.26 Spread of Fire or Products of Combustion: Installations of optical fiber cables and communications raceways in hollow spaces, vertical shafts, and ventilation or air-handling ducts shall be made so that the possible spread of fire or products of combustion will not be substantially increased. Openings around penetrations of optical fiber cables and raceways through fire-resistant-rated walls, partitions, floors, or ceilings shall be fire-stopped using approved methods to maintain the fire resistance rating.
  - 770.27 Temperature Limitation of Optical Fiber Cables: Optical fiber cables shall not be used in such a manner that its operating temperature exceeds that of its rating.

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Article 770 – Optical Fiber Cables:

- Part I – General:
  - Table 770.179 Cable Markings:
    - Cable Marking: Type:

Cable Marking:	Type:
OFNP	Nonconductive optical fiber plenum cable
OFCP	Conductive optical fiber plenum cable
OFNR	Nonconductive optical fiber riser cable
OFCR	Conductive optical fiber riser cable
OFNG / OFN	Nonconductive optical fiber general-purpose cable
OFCG / OFC	Conductive optical fiber general-purpose cable

END OF PERIOD 4 – MODULE 4