

## SECTION 26 05 10 – CONDUCTORS AND CABLE

### PART 1 - GENERAL

#### 1.1 SUMMARY:

- A. This section details general requirements for low voltage power and control wire, cable and accessories, rated up to 600 Volts AC.
- B. Related Sections:
  - 1. Section 01701 - Building Systems Identification and Labeling
  - 2. Section 26 00 10 – Electrical Design Criteria

#### 1.2 QUALITY ASSURANCE:

- A. The Engineer of Record is responsible for designing cable and raceway system in accordance with applicable portions of NFPA 70 Codes and per good engineering practices.
- B. Electrical components, devices, and accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

#### 1.3 GENERAL REQUIREMENTS:

- A. All power, control and building wire shall be copper (no aluminum or aluminum alloy wire).
- B. Use stranded conductors for power circuits over # 8 AWG; solid is allowed for smaller conductor sizes and for control circuits.
- C. Minimum conductor size is 12 AWG for power and lighting circuits.
- D. Minimum conductor size is 16 AWG for Class 2 and 3 control circuits.
- E. Sharing of neutral wires for multiple single-phase circuits is prohibited.
- F. MC Cable to be color coded based on system use, as follows:
  - 1. MC cable used for Building Automation System (BAS) control wiring: Blue
  - 2. MC cable used for fire alarm wiring: red

#### 1.4 CABLE APPLICATIONS:

- A. Following is a summary of where various common types of cable installation methods are allowed. All other wiring installations shall be run in conduit.
- B. Type NMR (Romex) cable: 1-3 family residential facilities, run concealed for branch circuit power, lighting, fire and carbon monoxide circuit wiring only.
- C. Type UF cable: irrigation systems, run underground.
- D. Type AC cable (jacket used as ground): Not allowed.
- E. Type MC cable (with full-rated ground conductor): standard (steel) jacket and “MC-Light” aluminum jacket acceptable.
  - 1. Cable allowed after the first pull-point from the local branch circuit distribution panel; final connections to distribution panel to be run in conduit.

2. All facilities, dry interior, non-classified locations only, where run concealed within accessible walls and above accessible (hung) ceilings. Accessible walls are walls that have an accessible (hung ceiling) on at least one adjacent side.
    - a. Electrical branch circuits, equipment feeders rated less than 30 amps and control circuits (equipment and distribution panel feeders rated over 30 amps to be run in conduit).
    - b. Fire alarm circuits, notification and detection circuits and controlled device circuits (home run circuits from floor to floor and from main panel to subpanels to be run in conduit).
  3. Residential facilities with hard (plaster) ceilings, dry interior locations:
    - a. Electrical branch circuits, equipment feeders rated less than 30 amps and control circuits (equipment and distribution panel feeders rated over 30 amps to be run in conduit).
    - b. Fire alarm: notification and detection circuits and controlled device circuits (home run circuits from floor to floor to be run in conduit).
    - c. Carbon monoxide detector circuits and smoke detector circuits.
- F. Power-limited control wiring (BAS controls, telecommunications wiring, Audiovisual control wiring, etc.): All facilities, dry interior locations only, run concealed within accessible walls and above accessible (hung) ceilings. Accessible walls are walls that have an accessible (hung ceiling) on at least one adjacent side.
- G. Cabling run exposed within return air plenum spaces shall be rated for the application (low smoke jacketed cable).
- H. Type SO and SJO Cables (with full-rated ground conductor): All facilities, dry interior locations only. Use for portable equipment rated less than 30 amps. Larger loads shall be hard-wired.

#### 1.5 TERMINATIONS:

- A. Splices and taps under 600 volts:
  1. 10 AWG and smaller: copper compression type or twist-on metal spring-type connectors with color-coded insulating nylon covering. Connectors for exterior and direct burial use shall be listed for the application.
  2. 8 AWG and larger: hydraulic compression connectors, mechanical bolted pressure type, such as ILSCO Clear tap, or listed insulated terminal blocks.
- B. Cable lugs and Terminations under 600 volts:
  1. 10 AWG and smaller: copper compression type with color-coded insulating nylon covering.
  2. 8 AWG and larger: hydraulic compression connectors, pre-filled with anti-oxidant compound.
  3. Lug connections to bus bars: provide with tin-plated lugs and “Belleville” style washers.
  4. Tape all terminations to match cable insulation rating.
- C. “Push-on” type terminators and splice taps are not acceptable.

## PART 2 – PRODUCTS

Not Used

## PART 3 - EXECUTION

### 3.1 EXISTING WORK:

- A. Remove exposed abandoned wire and cable, including abandoned wire and cable above accessible ceiling finishes. Patch surfaces where removed cables pass through building finishes.
- B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install blank cover for abandoned boxes not removed.
- C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.
- D. Clean and repair existing wire and cable remaining or is wire and cable to be reinstalled.

### 3.2 INSTALLATION:

- A. Identify wire and cable under provisions of Section 01701. Identify each conductor with its circuit number or other designation indicated.
- B. All wiring and cabling shall be run in a neat and workmanlike manner; routed parallel or perpendicular to walls, beams, ceiling supports and building structure.
- C. Cables shall be directly supported to building structure and independent of other piping, mechanical equipment or ceiling supports. Cable supports shall be devices such as “caddy clips” and “bridle ring” supports and “J hooks”, listed for the intended use.
- D. Nylon tie wraps are not acceptable for cable supports; they are acceptable for cable training and bundling.
- E. Splices and terminations shall be made only within accessible outlet or junction boxes or equipment connection boxes.

### 3.3 WIRE COLOR:

- A. General:
  - 1. For wire sizes 6 AWG and smaller, install wire colors in accordance with the following:
    - a. Black and red for single phase circuits at 120/240 volts.
    - b. Black, blue, and red for circuits at 120/208 volts single or three phase.
    - c. Brown, orange, and yellow for circuits at 277/480 volts single or three phase.
  - 2. For wire sizes 4AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
    - a. Black and red for single phase circuits at 120/240 volts.

- b. Black, blue, and red for circuits at 120/208 volts single or three phase.
  - c. Brown, orange, and yellow for circuits at 277/480 volts single or three phase.
- B. Neutral Conductors: White for 120/240 and 120/208 volt circuits, and gray with a yellow tracer for 277/480 volt circuits. When two or more neutrals are located in one conduit, individually identify each with proper circuit number. When a common neutral is used a 200% rated neutral shall be provided.
- C. Ground Conductors:
- 1. For 6 AWG and smaller: Green.
  - 2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

END OF SECTION