

## SECTION 16120CPPR – CONDUCTORS AND CABLE

### PART 1 - GENERAL

#### 1.1 SYSTEM DESCRIPTION

- A. Product Requirements: Provide products as follows:
  - 1. All building wire shall be stranded copper (no aluminum wire).
  - 2. Use stranded conductors for control circuits.
  - 3. Conductor not smaller than 12 AWG for power and lighting circuits.
  - 4. Conductor not smaller than 16 AWG for control circuits.
  - 5. 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
  - 6. 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 150 feet.
  
- B. Wiring Methods: Provide the following wiring methods:
  - 1. Concealed Dry Interior Locations: Use only building wire Type THHN/THWN XHHW insulation in raceway, nonmetallic- sheathed cable, or metal clad cable as applicable.
  - 2. Exposed Dry Interior Locations: Use only building wire Type THHN/THWN XHHW insulation in raceway.
  - 3. Above Accessible Ceilings: Use only building wire Type THHN/THWN XHHW insulation, in raceway, nonmetallic-sheathed cable or metal clad cable as applicable.
  - 4. Wet or Damp Interior Locations: Use only building wire Type THHN/THWN XHHW insulation in raceway.
  - 5. Exterior Locations: Use only building wire Type THHN/THWN XHHW insulation in raceway.
  - 6. Underground Locations: Use only building wire Type THHN/THWN XHHW insulation in raceway.

#### 1.2 DESIGN REQUIREMENTS

- A. Conductor sizes are based on copper. Aluminum conductors are not allowed.
- B. Nonmetallic sheathed cable is only allowed in one and two family residences.
- C. Use of MC cable is limited to areas with prior written approval from Owner's Project Manager.

### PART 2 - PRODUCTS

#### 2.1 BUILDING WIRE

- A. Product Description: Stranded conductor insulated wire.

- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.

## 2.2 NONMETALLIC-SHEATHED CABLE

- A. Conductor: Copper.
- B. Insulation Voltage Rating: 600 volts, 90°C.

## 2.3 METAL CLAD CABLE

- A. Conductor: Copper.
- B. Insulation Voltage Rating: 600 volts.
- C. Insulation Temperature Rating: 90 degrees C.
- D. Insulation Material: Thermoplastic.
- E. Armor Material: Steel.
- F. Armor Design: Interlocked metal tape.

## 2.4 MEDIUM VOLTAGE CABLE

- A. Product Description: NEMA WC 7, cross-linked polyethylene 133% insulated cable.
- B. Voltage: 5 or 15 kV, as required.
- C. Conductor: Copper, compact round, stranded, with wire-woven conductor shield.
- D. Construction: Single conductor with metal tape insulation shielding.
- E. Jacket: PVC.
- F. Manufacturers:
  - 1. Okonite
  - 2. Pirelli
  - 3. Kerite
  - 4. Substitutions: Not permitted without written approval of Owner's Project Manager.

## 2.5 POTHEADS

- A. Product Description: IEEE 48, Class 1 termination. Pothead with porcelain insulators, cable connector and aerial lug, sealed cable entrance and support, and insulating compound.

- B. Conductors: 1.
- C. Manufacturers:
  - 1. Joslyn Manufacturing Company
  - 2. 3M
  - 3. Thomas & Betts
  - 4. Substitutions: Not permitted without written approval of Owner's Project Manager.

## 2.6 CABLE TERMINATIONS

- A. Product Description: IEEE 48, Class 2 porcelain insulator cable terminator in kit form.
- B. Manufacturers:
  - 1. 3M
  - 2. Joslyn Manufacturing Company
  - 3. Thomas & Betts
  - 4. Substitutions: Not permitted without written approval of Owner's Project Manager.

## 2.7 CAST-EPOXY CABLE TERMINATION

- A. Product Description: IEEE 48, Class 1 cast epoxy cable termination in kit form with stress cone, shield ground connection, wet porcelain rain shield for outdoor units, epoxy resin molding material, and accessories and molds required for proper application.
- B. Manufacturers:
  - 1. 3M
  - 2. Joslyn Manufacturing Company
  - 3. Thomas & Betts
  - 4. Substitutions: Not permitted without written approval of Owner's Project Manager.

## 2.8 MODULAR CABLE TERMINATION

- A. Product Description: IEEE 48, Class 1, molded-rubber cable termination in kit form with stress cone, ground clamp, non-tracking rubber skirts, load break connector, rubber cap, and aerial lug.
- B. Manufacturers:
  - 1. 3M
  - 2. Joslyn Manufacturing Company
  - 3. Thomas & Betts
  - 4. Substitutions: Not permitted without written approval of Owner's Project Manager.

## 2.9 FIREPROOFING TAPE

- A. Manufacturers:
  - 1. 3M
  - 2. A&M Tape Products
  - 3. Plymouth/Bishop
  - 4. Substitutions: Not Permitted

## 2.10 TAPE TERMINATION

- A. Product Description: IEEE 48; Class 1, tape termination kit with semi-conductive tape, stress control tape, splicing tape, vinyl plastic tape, stress cone, mechanical ground straps, and cable preparation kit.

# 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 16075. Identify each conductor with its circuit number or other designation indicated.
- B. Fireproof medium voltage cables in manholes using fireproofing tape in half-lapped wrapping. Extend fireproofing 1 inch (25mm) into duct.

## 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.

**Table 1. Summary of Color Code Requirements**

<b>120/240 Volt Single Phase Systems</b>	
Phase A	Black
Phase B	Red
Neutral	White
<b>120/208 Volt Single or Three Phase Systems</b>	
Phase A	Black
Phase B	Blue
Phase C	Red
Neutral	White
<b>277/480 Volt Single or Three Phase Systems</b>	
Phase A	Brown
Phase B	Orange
Phase C	Yellow
Neutral	Gray with yellow tracer

- 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