

## SECTION 16120

### CONDUCTORS AND CABLES

#### PART 1 GENERAL

##### 1.1 SUMMARY:

- A. Section Includes:
  - 1. Building wire and cable.
  - 2. Branch-circuit cable.
  - 3. Wiring connectors and connections.
  - 4. Drop cords.
- B. Related Documents: The Contract Documents apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections
  - 1. Section 16050 - Basic Electrical Materials and Methods: Basic electrical methods.
  - 2. Section 16130 - Raceway and Boxes: Conduit, fittings and conduit bodies, pull, junction, outlet, and switch boxes.

##### 1.2 REFERENCES

- A. National Electrical Contractors Association (NECA):
  - 1. NECA SI - Standard of Installation.
- B. National Electrical Manufacturer's Association (NEMA):
  - 1. NEMA WC 26 - Wire and Cable Packaging.
- C. National Fire Protection Association (NFPA):
  - 1. NFPA 70 - National Electrical Code.

##### 1.3 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Procedures for submittals.
  - 1. Product Data: Each cable assembly type.
  - 2. Assurance/Control Submittals:
    - a. Certificates: Manufacturer's certificate certifying that Products meet or exceed specified requirements.
    - b. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency.

##### 1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with NECA SI.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum 5 years documented experience.
- C. Regulatory Requirements:
  - 1. Conform to requirements of NFPA 70.
  - 2. Products: Listed and classified by Underwriters Laboratories, Incorporated as suitable for purpose specified and indicated.

##### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 - Product Requirements: Transport, handle, store, and protect products.

- B. Deliver in accordance with NEMA WC 26.

## PART 2 PRODUCTS

### 2.1 BUILDING WIRE AND CABLE

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  1. Anaconda
  2. Anixter.
  3. Cablec Continental Cable Company.
  4. Carol Cable Company.
  5. Essex-Paranite Corporation.
  6. General Cable.
  7. General Electric.
  8. ITT/Royal.
  9. Okonite.
  10. Rome Cable Corporation.
  11. Southwire Company.
  12. Triangle.
  13. Section 01600 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Description: Single conductor insulated wire.
- C. Conductor: Copper.
- D. Insulation Voltage Rating: 600 Volts.
- E. Insulation: NFPA 70, Type THHN/THWN.

### 2.2 BRANCH-CIRCUIT CABLE

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  1. Anaconda
  2. Anixter.
  3. Cablec Continental Cable Company.
  4. Carol Cable Company.
  5. Essex-Paranite Corporation.
  6. General Cable.
  7. General Electric.
  8. ITT/Royal.
  9. Okonite.
  10. Rome Cable Corporation.
  11. Southwire Company.
  12. Triangle.
  13. Section 01600 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Description: NFPA 70, Type THWN.
- C. Conductor: Copper.
- D. Insulation Voltage Rating: 600 volts.

E. Insulation Temperature Rating: 75 degrees C.

## 2.3 WIRING CONNECTORS

A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:

1. Buchanan.
2. Thomas and Betts.
3. 3M.
4. Section 01600 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

B. Compression Connectors; Conductor sizes #12 through #6 AWG:

1. Buchanan: 20065 or 2011S.
2. Thomas and Betts:
3. 3M

## 2.4 DROP CORDS

A. Description: Continuous length of cable with locking blade type connector body at lower end as indicated on Drawings. Secure cable at both ends with wire type stainless steel cable grips to prevent transmission of tension directly to conductors or terminal screws.

B. Junction Box: Furnished and installed flush with ceiling anchored to building structure for fastening of uppercord grip.

C. Cable: Type SO 600 volt flexible cord with three #12 stranded wires.

D. Connector Body: Single 120 volt, grounding receptacle of twistlock type that grips on cable insulation and is manufactured for use with wire cable grips. Furnish and install drop cords in length required for a receptacle height of 6 feet 8 inches above finished floor.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Section 01700 - Execution Requirements: Verification of existing conditions before starting work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

1. Verify that interior of building has been protected from weather.
2. Verify that mechanical Work likely to damage wire and cable has been completed.
3. Verify that raceway installation is complete and supported.

C. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

### 3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

### 3.3 INSTALLATION

A. Wiring methods

1. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN insulation in metallic raceway.

2. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN insulation in metallic raceway.
  3. Above Accessible Ceilings: Use only building wire, Type THHN/THWN insulation in metallic raceway.
  4. Wet or Damp Interior Locations: Use only building wire, Type THW or THHN/THWN insulation in raceway.
- B. Install products in accordance with manufacturers published instructions and NECA SI.
  - C. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
  - D. Use stranded conductors for control circuits and final connections to all vibration equipment.
  - E. Use conductor not smaller than 12 AWG for power and lighting circuits.
  - F. Use conductor not smaller than 14 AWG for control circuits.
  - G. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
  - H. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.
  - I. Pull all conductors into raceway at same time.
  - J. Use approved wire pulling lubricant for all building wire.
  - K. Protect exposed cable from damage.
  - L. Neatly train and lace wiring inside boxes, equipment, and panelboards in accordance with NECA Standards.
  - M. Clean conductor surfaces before installing lugs and connectors.
  - N. Make splices, taps, and ends to carry full ampacity of conductors with no perceptible temperature rise.
  - O. Use only compression connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
  - P. Use solderless pressure compression connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
  - Q. Use conductors rated 90 degrees C, inside a ballast compartment or within 6 inches of any ballast.
  - R. Conductor Sizes #8 and Larger: Class B stranding.
  - S. Install Drop Cords to building structure at locations indicated on Drawings as indicated on Drawings.

### 3.4 CONSTRUCTION

- A. Interface With Other Work:
  1. Identify wire and cable using Thomas and Betts type WM vinyl markers.
  2. Identify each conductor with its circuit number or other designation indicated on Drawings in all junction, pull, terminal boxes and cabinets. Identify neutrals with common circuit numbers in all junction, pull and terminal boxes, panels and cabinets.

### 3.5 WIRING COLOR CODE

- A. Comply with the following color code for each voltage system.

- B. 208Y/120 Volt System:
  - Phase A - Black
  - Phase A Switch Leg - Black with "S" tag.
  - Phase B - Red
  - Phase B Switch Leg - Red with "S" tag.
  - Phase C - Blue.
  - Phase C - Switch Leg - Blue with "S" tag.
  - Travelers - Yellow.
  - Neutral - White.
  - Equipment Ground - Green.
  
- C. 240/120 Volt System:
  - Phase A - Black.
  - Phase A Switch Leg - Black with "S" tag.
  - Phase B - Orange (High-Leg)
  - Phase C - Blue
  - Phase C Switch Leg - Blue with "S" tag.
  - Travelers - Yellow.
  - Neutral - White.
  - Equipment Ground - Green, with yellow stripe.
  
- D. 480Y/277 Volt System:
  - Phase A - Brown
  - Phase A Switch Leg - Brown with "S" Tag.
  - Phase B - Orange.
  - Phase B Switch Leg - Orange with "S" Tag.
  - Phase C - Yellow
  - Phase C Switch -Leg- Yellow with "S" Tag.
  - Travelers - Yellow with "T" Tag.
  - Neutral - Grey.
  - Equipment Ground - Green with Yellow stripe.
  
- E. Provide identification tags on each conductor entering panel, switch, junction box and pull box to identify conductor.

### 3.6 FIELD QUALITY CONTROL

- A. Section 01450 - Quality Control: Field testing and inspection.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION