

SECTION 260519-LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes building wire and cable; nonmetallic-sheathed cable; direct burial cable; service entrance cable; armored cable; metal clad cable; and wiring connectors and connections.

1.2 REFERENCES AND QUALITY ASSURANCE

- A. NECA (National Electrical Contractors Association) - Standard of Installation.
- B. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. NFPA 70.
- D. UL – Underwriters Laboratory.
- E. NEMA WC.

1.3 SYSTEM DESCRIPTION

- A. Product Requirements: Provide products as follows:
 - 1. Stranded conductor for feeders and branch circuits 10 AWG and smaller.
 - 2. Stranded conductors for control circuits.
 - 3. Conductor not smaller than 12 AWG for power and lighting circuits.
 - 4. Conductor not smaller than 14 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 **200 feet**
- B. Wiring Methods: Provide the following wiring methods:
 - 1. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
 - 2. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
 - 3. Above Accessible Ceilings: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
 - 4. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
 - 5. Exterior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
 - 6. Underground Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.

1.4 DESIGN REQUIREMENTS

- A. Conductor sizes are based on copper.

1.5 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit for building wire and each cable assembly type.
- C. Samples:
 - 1. Submit 1 each, 18 inch length of cable assembly from each reel.
 - 2. Select each length to include complete set of manufacturer markings.
 - 3. Attach tag indicating cable size and application information.
- D. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.
- E. Test Reports: Indicate procedures and values obtained.

1.6 CLOSEOUT SUBMITTALS

- A. Section 017700 – Closeout Procedures.
- B. Project Record Documents: Record actual locations of components and circuits.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on Drawings.

1.9 COORDINATION

- A. Section 013300 - Submittals.
- B. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.
- C. Wire and cable routing indicated is approximate unless dimensioned. Include wire and cable lengths within 10 ft of length shown.

1.10 QUALITY ASSURANCE

- A. Perform Work in accordance with the National Electric Code and the Ohio Building Code, UL and all other codes and ordinances including NEMA 600C.

PART 2 PRODUCTS

2.1 BUILDING WIRE

- A. Manufacturers:
 - 1. American Insulated Wire Corp.
 - 2. Rome Cable Corp.
 - 3. South Wire Co.
- B. Product Description: Single conductor insulated wire.
- C. Conductor: Copper, 985 conductivity
- D. Insulation Voltage Rating: 600 volts.

2.2 WIRING CONNECTORS

- A. Insulated Compression Connectors: ILSCO, T & B, Burndy

PART 3 EXECUTION

3.1 EXAMINATION

- A. Refer to Division 1 requirements.
- B. Verify interior of building has been protected from weather.
- C. Verify mechanical work likely to damage wire and cable has been completed.
- D. Verify raceway installation is complete and supported.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

- A. Route wire and cable to meet Project conditions.
- B. Install wire and cable in accordance with NECA "Standard of Installation."
- C. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- D. Identify and color code wire and cable under provisions of Section 260553. Identify each conductor with its circuit number or other designation indicated.
- E. Special Techniques--Building Wire in Raceway:
 - 1. Pull conductors into raceway at same time.
 - 2. Install building wire 4 AWG and larger with pulling equipment.
- F. Special Techniques - Cable:

1. Protect exposed cable from damage.
2. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure. Do not rest cable on ceiling panels.
3. Use suitable cable fittings and connectors.

G. Special Techniques - Wiring Connections:

1. Clean conductor surfaces before installing lugs and connectors.
2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
7. Install suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.
8. Install solid conductor for feeders and branch circuits 10 AWG and smaller.
9. Install stranded conductors for branch circuits 10 AWG and smaller. However, when stranded conductors are used in lieu of solid, then install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.

H. PERFORMANCES

1. THHN/THWN for service entrance
2. THHN/THWN for feeders and branch circuits

3.4 WIRE COLOR

A. General

1. For wire sizes 10 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, red, and blue for circuits at 120/208 volts single or three phase.
 - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
2. For wire sizes 8 AWG 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, red, and blue for circuits at 120/208 volts single or three phase.
 - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.

- B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.

- C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.
- D. Feeder Circuit Conductors: Uniquely color code each phase.
- E. 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.

3.5 FIELD QUALITY CONTROL

- A. Refer to Division 1 requirements.
- 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 260519

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