

**SECTION 26 05 13  
ELECTRICAL WIRE AND CABLE**

**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Building wire and cable
- B. Wiring connectors and connections

1.2 REFERENCES

- A. ANSI/NFPA 70 - National Electric Code

1.3 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years of experience.

1.4 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Wire and cable routing shown on Drawings is approximate unless dimensioned.
  - 1. Route wire and cable as required to meet the Project Conditions.
- C. Where wire and cable routing is not on plans, and only the destination only is on the plans, determine exact routing and lengths required.

1.5 COORDINATION

- A. Determine required separation between cable and other work.
- B. Determine cable routing to avoid interference with other work.

**PART 2 PRODUCTS**

2.1 BUILDING WIRE AND CABLE

- A. Description
  - 1. Single conductor insulated wire
  - 2. Thermostat cable
  - 3. Type MC cable
    - a. Interlocked construction
    - b. Connectors shall be steel or malleable iron with steel locknuts, do not use push-in or snap-in connectors.
- B. Conductor: Copper
- C. Insulation Voltage Rating
  - 1. Single conductor wire - 600 volt
  - 2. Thermostat cable - 300 volt
  - 3. Type MC cable – 600 volt
- D. Insulation
  - 1. Single conductor wire - NFPA 70 Type THHN/THWN
  - 2. Thermostat cable - Multi-conductor jacketed
  - 3. Wire and cables shall be listed by a nationally recognized testing lab for the environmental conditions they are installed.
- E. Temporary wiring according to National Electrical Code, open conductors are permitted.

2.2 WIRING CONNECTORS

- A. Solderless Pressure Connectors
  - 1. IlSCO
  - 2. Substitutions: Under provisions of Section 01 60 00

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- B. Spring Wire Connectors
  - 1. Ideal
  - 2. Scotchloc
  - 3. Holub
  - 4. Substitutions: Under provisions of Section 01 60 00
- C. Compression Connectors
  - 1. Panduit
  - 2. Burndy
  - 3. 3M
  - 4. Substitutions: Under provisions of Section 01 60 00
- D. Insulate Multi Cable Connector Blocks
  - 1. Polaris products molded for precise fit and supplied with removable access plugs over hex screws.
- E. Do not use insulation piercing or push-in type connectors.
- F. Do not use split-bolt type connectors.
- G. Do not use silicon filled twist on wire connectors in wet locations.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire and cable is complete before installation of work under this section.

#### **3.2 PREPARATION**

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

#### **3.3 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Use stranded conductors for control circuits.
- C. Use conductor no smaller than 12 AWG for power and lighting circuits.
- D. Use conductor no smaller than 16 AWG to supply a single fixture.
- E. Use conductor no smaller than 14 AWG for control circuits.
- F. Conductors for thermostats:
  - 1. Low voltage thermostats (0-30 volts) - use thermostat cable with conductors 18 AWG or larger, with a minimum of 5-conductors and a maximum length of 50' or single conductors 14 AWG or larger.
  - 2. All other thermostats use single conductors 14 AWG or larger.
- G. Pull all conductors into raceway at same time.
- H. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- I. Protect exposed cable from damage.
- J. Use suitable cable fittings and connectors.
- K. Neatly train the wiring inside boxes, equipment, and panel boards.
- L. Clean conductor surfaces before installing lugs and connectors.
- M. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- N. Use sealed weatherproofing kits for underground splices.
- O. Provide 8" of free conductor at outlet, switch, and junction boxes.
  - 1. Conductors not spliced or terminate at the box, shall require only 6" loop inside each box.

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- P. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 8 AWG and smaller.
  - Q. Splices and joints made in conductors #6 AWG and larger shall be with copper compatible sleeves using indent method or "Ilsco" or equal insulated power distribution block.
  - R. Maximum size wire: 600 MCM.
  - S. Conductors and cables, regardless of voltage, shall be installed in a complete raceway system, except:
    - 1. Underground irrigation zone control wires of 24 volts or less.
    - 2. Temporary wiring
    - 3. Open wiring as permitted by 27 60 00.
  - T. Adjust conductor size to compensate for a maximum of 3% voltage drop for branch circuits and maximum of 2% voltage drop for feeders.
  - U. Use minimum size #10 AWG conductors for all 20 amps, 120-volts branch circuits longer than 200 feet and use minimum size #10 AWG conductors for all 20 amps, 277-volts branch circuits longer than 300 feet.
  - V. When flexible conduit is used, use stranded wire in the raceway.
  - W. Type MC cable may only be used as a fixture whip from a single fixture to a junction box - maximum length of 6-feet
- 3.4 INTERFACE WITH OTHER PRODUCTS
- A. Identify wire and cable under provisions of Section 26 05 33.
- 3.5 FIELD QUALITY CONTROL
- A. Perform field inspection and testing under provision of Section 01 45 00 and 26 05 00.
  - B. Inspect wire and cable for physical damage and proper connection.
    - 1. Damaged conductors will be replaced at no cost to the District.
  - C. Tighten all connections to the manufacturer's recommended values.
    - 1. Engineer shall witness the torque values and submit a written report of the measurements and statement that they are correct to the Owner's representative.
    - 2. Provide copy of the approved report at time of equipment inspection by the Commissioning Agent.
  - D. Verify continuity of each branch circuit conductor.
  - E. Conductors for circuits of 100 amps or larger shall be tested with a megger.
    - 1. The Engineer of Record or designated representative shall review all megger test results.
    - 2. The Engineer of Record or designated representative shall witness a minimum of 10 % of the test.
    - 3. Submit all Engineer approved megger test to the Building Department.
    - 4. Provide copy of the approved report at time of equipment inspection by the Commissioning Agent.
  - F. Test all service conductors with a megger.
    - 1. The Engineer of Record or designated representative shall witness all service conductor meggering.
    - 2. The Contractor shall record the results and the Engineer of Record shall approve.
    - 3. The Building Department requires a copy of the approved report before they authorize the utility company to turn on the power.
  - G. Megger report shall at a minimum include the following for the Commissioning Agent
    - 1. Test date
    - 2. Manufacture and model number of test equipment.

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3. Provide documentation of the last re-calibration of test equipment.
4. Weather conditions including humidity at time of test.
5. Sign-in sheet of witnesses.
6. Verification the test voltage was 1000 volts for at least one minute.
7. The results shall be in numerical value.
8. Provide circuit description, including circuit id, wire size, and length.
  - a. Indicate service conductor in description.
9. Configuration shall include A-B, A-C, B-C, A-N, B-N, C-N, A-G, B-G, C-G, and N-G, where applicable.
10. Check the test equipment at the start and end of each test session with the test lead open test and a short test.
  - a. Provide copy of the confirmation of passing the open and short tests.

END OF SECTION