

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

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.2 QUALITY ASSURANCE

- A. 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.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS**2.1 CONDUCTORS AND CABLES**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Southwire Company
 - 2. General Cable Technologies Corporation
 - 3. Cerrowire LLC
 - 4. Encore Wire Corporation
 - 5. AFC Cable Systems
- B. Use Copper Conductors Only: UL-Listed, comply with NEMA WC 70. All conductor sizes are based on the use of copper materials and are code required minimum sizes. Conductor sizes exceeding ampacity requirements of the circuit are sized for voltage drop and shall be installed as indicated.
- C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN-2.
- D. Minimum Size: Wire smaller than No. 12 AWG shall not be used unless specifically indicated herein or on the drawings
 - 1. No. 14 AWG (or larger) copper, solid or stranded, 90° C. wire shall be permitted for control wiring applications. Where stranded conductors are used, provide with spade type insulated copper terminals.

2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hubbell Power Systems, Inc.
 - 2. O-Z/Gedney; EGS Electrical Group LLC.

3. 3M; Electrical Products Division.
 4. Ideal Industries, Inc.
 5. ILSCO
- B. Description: UL-Listed, Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.
- C. Conductors smaller than or equal to No. 8 AWG are permitted to be spliced or tapped with spring pressure, screw-on, pre-insulated connectors rated for the circuit involved.
- D. Conductors larger than No. 8 AWG shall be spliced with compression connectors (fully insulated).

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders & Branch Circuits: **Copper**. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION, APPLICATIONS AND WIRING METHODS

- A. Service Entrance and all other underground circuits: Type THWN-2, single conductors in raceway.
- B. Feeders & Branch Circuits: Type THHN/THWN-2, single conductors in raceway.
- C. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- D. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- E. Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Install wires and cables as indicated, according to manufacturer's written instructions and NECA's "Standard of Installation."
- B. Conceal conductors & cables in finished walls, ceilings, and floors, unless otherwise indicated via raceway.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed conductors & cables (in raceway) parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

- G. Identify and Color-code conductors and cables according to Section 260553 "Identification for Electrical Systems." Note: All conductors shall have fully colored, factory applied insulation.
- H. Seal around cables/raceways penetrating fire-rated elements according to Section 078413 to restore original fire-resistance rating of assembly. Seal cable and wire (between conduit and conductor) entering a building from underground where the conductor(s) exit the conduit, with a non-hardening compound listed for such use.
- I. Neatly form and tie all wires inside panelboards, cabinets, wireways, switches, equipment enclosures, etc.
- J. Install cable supports (split wedge type) inside raceways for all vertical feeder runs in accordance with the NFPA 70.
- K. Where quantities of conductors in a raceway system are not shown / missing on the drawings, provide the number as required to maintain function, control and number of circuits indicated.
- L. Do not share the neutral conductor across phases. Provide dedicated neutral conductor per phase conductor.
- M. Maximum of (3) 20A-1P branch circuits per raceway.
- N. Do not route branch circuits from one panelboard through another panelboard (can). All branch circuits shall exit the source panelboard via "homerun" raceway(s).

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Electrical Connections: Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer and per NFPA 70 Article 110.14. See receptacle wiring detail on drawings.
- C. Wiring at Outlets: Install conductor at each outlet, with at least **8 inches** of slack.
- D. All wires shall be routed within conduit, shall be of the same insulation type and shall be continuous between outlets and boxes (no splices or taps in conduit).
- E. Keep all splicing to a minimum. Splicing will not be allowed in panelboards, switchboards or other enclosures where the conductor(s) are to be terminated.
 - 1. Make splices and taps that are compatible with conductor material (copper) and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors. All conductor splices larger than #6AWG shall be spliced using compression method insulated with a heavy wall shrink tubing.
 - 2. Unsatisfactory splices or terminations shall be re-worked as directed by the Engineer at no additional cost to the Owner.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test conductors for compliance with requirements.
 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Test electrical insulation using megger testing. Certify compliance with test parameters.
 3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
 - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- C. Test Reports: Prepare a written report to record the following:
1. Test procedures used.
 2. Test results that comply with requirements.
 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519