

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Conductors wire and cables.
2. Metal-clad cable, Type MC, rated 600 V or less.
3. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 CONDUCTORS WIRE AND CABLES

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B496 for stranded conductors.
3. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for armored cable, Type AC or metal-clad cable, Type MC with ground wire.
4. Conductor Insulation:
 - a. Type NM: Comply with UL 83 and UL 719.
 - b. Type RHH and Type RHW-2: Comply with UL 44.
 - c. Type USE-2 and Type SE: Comply with UL 854.
 - d. Type THHN and Type THWN-2: Comply with UL 83.

- e. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
- f. Type XHHW-2: Comply with UL 44.

2.2 METAL-CLAD CABLE, TYPE MC

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.
- B. Standards:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - 2. Comply with UL 1569.
- C. Circuits:
 - 1. Single circuit and multi circuit with color-coded conductors.
 - 2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.
- D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors Aluminum, complying with ASTM B800 and ASTM B801.
- E. Ground Conductor: Insulated.
- F. Conductor Insulation:
 - 1. Type TFN/THHN/THWN-2: Comply with UL 83.
 - 2. Type XHHW-2: Comply with UL 44.
- G. Armor: Steel, Aluminum, interlocked.
- H. Jacket: PVC applied over armor.

2.3 CONNECTORS AND SPLICES AND TERMINATIONS

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.
- C. Aluminum Conductor connections shall be dual rated and listed by UL for use with aluminum and copper conductors and sized to accept aluminum conductors of the ampacity specified.
- D. All connector connections shall be wire brushed and an oxide inhibitor compound applied.
- E. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper, Aluminum, Bronze.
2. Type: One hole with standard barrels.
3. Termination: Crimp.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders/Risers: Copper stranded for No. 8 AWG and larger, or Aluminum stranded for No. 6 AWG and larger.
Note: Aluminum conductors subject to approval from Licensed Professional and cost review.
- B. Branch Circuits: Copper Solid No. 12 AWG.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-2-THWN-2, Type XHHW-2 single conductors in raceway.
- B. Exposed Feeders: Type THHN-2-THWN-2, Type XHHW-2 single conductors in raceway, Metal-clad cable, Type MC.
- C.
- D. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Armored cable, Type AC or metal-clad cable, Type MC with ground wire. .
- E. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.
- F. Feeders in Cable Tray: Armored cable, Type AC , Metal-clad cable, Type MC where identified for such use.
- G. Exposed Branch Circuits, Including in Crawlspace: Armored cable, Type AC
- H. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Armored cable, Type AC .
- I. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

- 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. Metal stud grommets must be provided at all locations where conductors and cables are installed within metal studs and joists.
- F. Metal wire protection plates must be provided at all locations where conductors and cables are installed at a depth of 1 ¼" and less within metal or wood studs.
- G. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- H. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

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-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material.
- C. All connector connections shall be wire brushed and an oxide inhibitor compound applied.
- D. Wiring at Outlets: Install conductor at each outlet, with at least **6 inches (150 mm)** of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding the following critical equipment and services for compliance with requirements.
 - a. Required by NEC code and Utility Company. Any defects shall be promptly remedied and at completion of all Electrical Work shall be left in perfect operation order.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- B. Test and Inspection Reports: Prepare a written report to record the following:
 - 1. Procedures used.
 - 2. Results that comply with requirements.
 - 3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519