1. **GENERAL**
   1. RELATED DOCUMENTS
      1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work in this Section.
      2. This Section is a Division 26 "Basic Materials and Methods" section, and is part of each Division 16 section making reference to conductors.

**NOTE TO SPECIFIER: REVISE LIST OF CABLE TYPES FOR EACH PROJECT AS REQUIRED.**

* 1. Description of Work: Extent of electrical wire and electrical cable work is indicated by drawings and schedules. Types of wire, cable and connectors in this Section include the following:
     1. Copper conductors
     2. Power-limited circuit cable
     3. Service entrance cable
     4. Aluminum conductors
     5. VFD Cable
  2. QUALITY ASSURANCE
     1. Manufacturers: Firms regularly engaged in the manufacture of electric wire and cable products of types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
     2. Installer: Qualified with at least 3 years of successful installation experience on projects with electrical wiring work similar to that required for this project.
  3. REFERENCES
     1. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical wire, cable and connectors.
     2. UL Compliance: Comply with UL standards pertaining to electrical wire cable and connectors.
     3. UL Labels: Provide electrical wires, cables and connectors which have been UL-listed and labeled.
     4. NEMA/ICEA Compliance: Comply with applicable portions of NEMA/Insulated Cable Engineers Association Standards pertaining to materials, construction and testing of electrical wire and cable.
     5. ANSI/ASTM: Comply with applicable portions of ANSI/ASTM standards pertaining to construction of electrical wire and cable.
     6. IEEE Compliance: Comply with applicable portions of IEEE standards pertaining to electrical wire and cable.
     7. NECA Compliance: Comply with NECA's "Standard of Installation."
  4. SUBMITTALS
     1. Submit manufacturer's data on electric wire and cable.

1. **PRODUCTS**

**NOTE TO SPECIFIER: REVISE LIST OF MANUFACTURERS FOR EACH PROJECT, AS REQUIRED.**

* 1. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of wire, cable and connector):
     1. WIRE AND CABLE:
        1. Advance Wire and Cable, Inc.
        2. Cerro Wire and Cable, Co.
        3. Electrical Conductors, Inc.
        4. General Cable Corp.
        5. Hitemp Wires, Inc.
        6. Rome Cable Corp.
        7. Southwire Company
        8. The Okonite Company
        9. Belden
     2. CONNECTORS:
        1. Amp, Inc.
        2. Burndy Corp.
        3. Eagle Electric Mfg. Co., Inc.
        4. Gould, Inc.
        5. Ideal Industries, Inc.
        6. Josylyn Mfg. and Supply Co.
        7. O-Z/Gedney Co.
        8. Pyle National Co.
        9. Thomas and Betts Co.
  2. WIRE, CABLE, AND CONNECTORS
     1. General: Except as otherwise indicated, provide wire, cable and connectors of manufacturer's standard materials, as indicated by published product information; designed and constructed as recommended by manufacturer, and as required for the installation.
     2. WIRE:
        1. Conductors shall be 600-volt and shall be copper with insulation of the following types, unless otherwise noted on the drawings or in these specifications. 600-volt aluminum conductors will be considered for conductors feeding switchboards, switchgear, panel boards, motor control centers, and load centers rated above 225 amps. If aluminum is desired a waiver shall be requested from the UNL Project Manager on a project by project basis. Aluminum conductors shall be AA-8000 series, terminated on crimped terminals, and shall meet or exceed Southwire SIMpull product performance.
        2. For dry locations, provide Type THHN conductors. Conduit sizes are based on type THHN wire.
        3. For damp or wet locations, provide Type THWN conductors.
        4. Provide Type THWN conductors for service entrance cabling or feeders direct buried, or installed in underground raceways. Provide Type THWN conductors for branch circuit conductors installed in underground raceways.
        5. No wire shall be smaller than No. 12 AWG, except that wiring for signal and pilot control circuits may be No. 14 AWG, and pre-manufactured fixture whips for light fixtures may be No. 14 AWG.
           1. Use preinsulated connectors 3M Company "Scotchlok," or Ideal Industries, Inc. "super nut," for splices and taps in conductors No. 10 AWG and smaller. All other twist-on connectors must be reviewed by the Architect prior to installation. Use this type of connector for factory-made splices in fixtures or equipment.
           2. Pressure indent type connectors must be submitted to the Architect for review.
           3. Tape all splices and joints with vinyl plastic tape manufactured by Minnesota Mining and Manufacturing Company. Use sufficient tape to secure insulation strength equal to that of the conductors joined.
           4. Keep splices in underground junction boxes to an absolute minimum. Where splices are necessary, use resin pressure splices and resin splicing kits manufactured by the 3M Company, St. Paul, Minnesota, or equal to totally encapsulate the splice. Arrange the splicing kit to minimize the effects of moisture.
        6. Connect wire No. 6 AWG and larger to panels and apparatus by means of approved lugs or connectors.
        7. Wire No. 12 AWG and No. 10 AWG is allowed to be stranded or solid. All wire No. 8 AWG and larger shall be stranded.
        8. Connectors of the porcelain cup type with or without metal inserts shall not be used, including all splices in fixtures which are made in advance by the fixture manufacturer. Splices in wire No. 8 AWG and larger shall be made with approved solderless lugs. If any type of pressure indent type connector is proposed for use on any size conductor, it shall be specifically submitted for approval prior to use.
        9. Wire sizes shown are minimum based on code requirements, voltage drop and/or other considerations. Larger sizes may be installed at the Contractor's option to utilize stock size, provided conduit sizes are increased where necessary to conform to the National Electrical Code. Sizes of wires and cables indicated or specified are American Wire Gage (Brown and Sharpe).
        10. All feeder and branch circuit wiring shall be color-coded as follows:

PHASE 120/208 VOLT 277/480 VOLT

A Black Brown

B Red Orange

C Blue Yellow

Neutral White Gray

Ground Green Green

It is acceptable to provide continuously colored conductors in lieu of black jacketed conductors with colored tape at terminals.

### VFD Cable

1. All VFD cables between VFD and downstream motors shall be symmetrical, fully shielded, with fully rated ground conductor integral. Belden classic 300% braid design 2KV VFD cable, rated to 2000V, no equal.
2. VFD cable ground shall be fully rated to match phase conductors. Ground shall be positively grounded from motor wiring terminations box to the motor frame itself.
3. Ground from VFD back to source panel to be fully rated to match phase conductors.

**NOTE TO SPECIFIER: DELETE REFERENCE TO ALUMINUM WIRE FOR MOST PROJECTS. IF ALUMINUM WIRE MUST BE USED, RETAIN SECTION BELOW.**

1. **EXECUTION**
   1. INSTALLATION
      1. General: Install electric cables, wires and connectors as indicated in compliance with manufacturer's written instructions, applicable requirements of the NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices.
      2. Coordinate cable and wire installation work with electrical raceway and equipment installation work, as necessary for proper interface.
      3. Conductors shall be continuous from outlet to outlet and no splices shall be made except within outlet or junction boxes. Junction boxes may be utilized wherever required.
      4. Splicing: No splicing or joints will be permitted in either feeder or branch circuits except at outlet or accessible junction boxes.
      5. Wire shall not be installed in raceways until the concrete work and plastering is completed and all conduits in which moisture has collected have been swabbed out. Insulation resistance to ground shall not be less than that approved by NEC. Eliminate splices wherever possible.
      6. Use pulling compound or lubricant where necessary. Compound must not deteriorate conductor insulation.
      7. Prior to energization, check cable and wire for continuity of circuitry, and for short circuits. Correct malfunctions when detected.
      8. Bury a continuous, pre-printed, bright colored plastic ribbon cable marker with each underground cable, regardless of whether conductors are in conduit. Locate each directly over cables 12" below finished grade.
      9. Conductor Installation: Install all conductors in a single raceway at one time, insuring that conductors do not cross one another while being pulled into raceway. Leave sufficient cable at all fittings or boxes and prevent conductor kinks. Keep all conductors within the allowable tension and exceeding the minimum bending radius.
      10. Conductor Support: Provide conductor supports as required by the code and recommended by the cable manufacturer. Where required, provide cable supports in vertical conduits similar to OZ Type C.M.T., and provide the lower end of conduit with OZ Type KVF ventilators.
      11. Conductor Termination: Provide all power and control conductors that terminate on equipment or terminal strips, with solderless lugs or fork and flanged tongue terminals. Provide T and B "sta-kon" tongue terminal. This type conductor termination is not required when the equipment is provided with solderless connectors.
      12. Many circuits are shown on the drawings to be provided with dedicated neutral and ground conductors. Carefully review circuiting and the electrical abbreviations and symbols legend and provide the number of conductors indicated.

END OF SECTION 260519