

Section 16120

600-VOLT POWER AND CONTROL CABLE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specifications for 600-volt power and control cable.

1.02 REFERENCES

- A. American National Standards Institute/National Fire Protection Association (ANSI/NFPA), NFPA 70 - National Electrical Code (NEC), Article 310 - Conductors for General Wiring
- B. Underwriter's Laboratories (UL)
  - 1. UL 83: Thermoplastic Insulated Wires and Cables
  - 2. UL 1063: Machine Tool Wires and Cables
- C. American Society for Testing and Materials (ASTM)
  - 1. ASTM B 3: Soft or Annealed Copper Wires
  - 2. ASTM B 8: Concentric-Lay-Stranded Copper Conductors, Hard, Medium Hard, Soft
- D. Insulated Cable Engineers Association (ICEA), ICEA S-61-402: Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC-5)
- E. City of Galveston Electrical Code

1.03 SUBMITTALS

- A. Make submittals following Section 01300 - Submittal Procedures.
  - 1. Manufacturer's cut sheets, catalog data
  - 2. Instruction for handling and storage
  - 3. Dimensions and weight
  - 4. Conformance certificate

1.04 QUALITY ASSURANCE

- A. Tests. Cable shall meet all the requirements of Part 6 of ICEA S-61-402.
- B. Conformance Certificate and Quality Assurance Release: Submit a conformance certificate signed by the person responsible for product quality. The certificate shall specifically identify the purchased material or equipment; such as by the project name and location, purchase order number, supplements, and item number where applicable, including materials and services provided by others. The certificate shall indicate that requirements have been met and identify any approved deviations.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Ship wire and cable on manufacturer's standard reel sizes unless otherwise specified. Where cut lengths are specified, mark reel footage accordingly. Each reel shall contain one continuous length of cable. Provide impact protection by wood lagging or suitable barrier across the traverse of the reel. Provide moisture protection by using manufacturer's standard procedure or heat shrinkable self-sealing end caps applied to both ends of the cable.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. American Insulated Wire Corporation
- B. Carol Cable Company, Inc.
- C. General Cable Company
- D. Okonite Company
- E. Rome Cable Company
- F. Triangle Wire and Cable, Inc.

2.02 MATERIALS AND EQUIPMENT

- A. Design. Provide cable designated as THWN/THHN or XHHW single conductor type and UL 83 and UL 1063 listed, rated 600 volts and certified for continuous operation at maximum conductor temperature of 90 C in dry locations and 75 C in wet locations while installed above ground in conduit or in control panels.
- B. Power and control cables installed in underground situations require the use of Type CO cable as manufactured by Draka.
- C. Conductors. Provide conductors which are Class B, concentric stranded, annealed uncoated copper with physical and electrical properties complying with ASTM B 3 and ASTM B 8 and Part 2 of ICEA S-61-402.
- D. Insulation. Each conductor shall be PVC insulated and nylon jacketed to meet the requirements of Part 3 of ICEA S-61-402. The insulation thickness shall match the dimensions listed in Table 310-13 of the National Electrical Code (NEC) for type THHN and THWN wire.

A. Wire Marking

- 1. Wire marking shall be in accordance with National Electrical Code (NEC) Article 310-11 and shall be printed on the wire insulation at 2-foot intervals.
- 2. The printing method used shall be permanent and the color shall sharply contrast with the jacket color.

B. The single conductor color coding shall be as follows:

<u>System Voltage</u>	<u>A</u> ..... <u>B</u> ..... <u>C</u> ..... <u>Neutral</u>
120/208 Volt 3Ph/4w	Black .....Red .....Blue ..... White
120/240 Volt 3Ph/4w	Black .....Orange.....Blue ..... White
277/480 Volt 3Ph/4w	Brown.....Purple .....Yellow..... Grey
Motor Control	1.....Black 2.....Red 3.....Blue
Ground	.....Green

PART 3 EXECUTION

3.01 PREPARATION

- A. Complete the cable raceway systems and underground duct banks before installing cables.

- B. Verify sizing of raceways and pullboxes to ensure proper accommodation for the cables.
- C. Check the length of the cable raceway system against the length of cable on the selected reel.
- D. Clean conduits of foreign matter before cables are pulled.

### 3.02 INSTALLATION

#### A. Wiring Methods

1. Use wiring methods indicated on Drawings.
2. In general, use THHN/THWN or XHHW building wire for lighting, power and control wiring where conductors are enclosed in raceways in above ground conduit system. Use Type CO wire for all installations in underground conduit banks.
3. Do not use solid conductors.
4. Use conductors not smaller than No. 12 AWG stranded for lighting circuits.
5. Use conductors not smaller than No. 14 AWG for control circuits, except when part of a multiconductor cable or internal panel wiring.
6. Do not splice conductors unless approved by the Owner's Representative.
7. Splices associated with taps for lighting and control circuits are allowed without approval as long as they are above elevation 12 MSL.
8. Make splices only in accessible junction boxes.
9. Use wire nuts with insulated caps for lighting wiring splices.

#### B. Single Conductor in Conduit and Ductbank

1. Install cables in accordance with the manufacturer's instructions and the National Electrical Code (NEC), Chapter 3- Wiring Methods and Materials. Do not exceed maximum wire tension, maximum insulation pressure and minimum bending radius.
2. Pull cables into conduits using wire pulling compounds approved by cable manufacturers to reduce friction. Lubricants must not be harmful to the conductor insulation. Mixtures containing soap or detergent shall not be used.

- C. Single Conductor in Cable Tray. Do not install single conductor building wire and cable in cable tray.
  
- D. Preparation for Termination
  - 1. Make 600-volt power cable terminations and splices with heat shrinkable sleeves and seals.
  - 2. Terminal lugs and connectors for all sizes of conductors shall be crimp-on type.
  - 3. For size 1/0 AWG and larger, crimp-on lugs shall have the long barrel with 2-hole tongues except in places where termination space is limited.
  
- E. Tests
  - 1. In general, megger test insulation integrity of the wiring system before terminating. All testing results shall be submitted for approval.
  - 2. Make sure to disconnect sensitive electronic equipment before testing insulation.
  - 3. Use a 500 VDC megohmmeter and perform the wire system insulation test in accordance with the operating instructions.
  
- F. Termination. After the 600-volt wiring system has been tested with satisfactory results, reconnect wire.

END OF SECTION