

## SECTION 26 05 19

### LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

#### PART 1 GENERAL

##### 1.01 REFERENCES

- A. Specify Underwriters Laboratories (UL) or other recognized testing agency listed equipment, assemblies and materials.
- B. Where appropriate, refer to current NEMA Standards for material ratings.
- C. National Electrical Code (NEC) (current edition).
- D. Local Authority Having Jurisdiction.

#### PART 2 PRODUCTS

##### 2.01 BUILDING WIRE

- A. Insulated Wire:
  - 1. Types THHN, THWN, XHHW; rating 600V, 90°C or higher.
  - 2. Insulation types specified shall conform to NEC requirements for temperature, moisture, and mechanical environmental conditions.
- B. Conductor Material:
  - 1. Conductors #10 AWG and larger, stranded copper.
  - 2. Conductors #12 can be stranded copper.
  - 3. Conductors smaller than #12 AWG, solid copper.
- C. Control Wire: Stranded copper with 600V insulation, 90°C or higher.
- D. Minimum Size:
  - 1. Minimum wire size of #12 AWG for power and lighting circuits.
  - 2. Minimum wire size #14 AWG for control and signal circuits.

##### 2.02 REMOTE CONTROL AND SIGNAL CABLE

- A. Class 1, 2, or 3:
  - 1. Shall comply with NEC Article 725.
  - 2. Class 1: Copper conductor, 600V insulation, rated 75°C or higher.
  - 3. Class 2 & 3: Listing and marking per NEC Article 725.
  - 4. All control and signal cables shall be installed in conduit except for security wiring. See relevant section for Security system wiring.

##### 2.03 MODULAR WIRING SYSTEMS

- A. Modular wiring systems are not allowed.

##### 2.04 METAL CLAD CABLE

- A. Type AC cable not allowed.
- B. Type MC cable allowed in very limited locations.

##### 2.05 TERMINATION

- A. Splices and taps are to carry full ampacity of conductors without perceptible temperature rise. Temperature rating shall match cable temperature rating.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Device removal in a multi-wire branch circuit: Where a circuit extends through a receptacle, it shall be a requirement that all conductors shall be pigtailed so downstream load does not go through receptacles.
- B. Wire Sizing:
  - 1. For 20 ampere 120V circuits longer than 75', use #10 AWG conductors.
  - 2. For 20 ampere 277V circuits longer than 150', use #10 AWG conductors.
  - 3. For circuit amperes other than 20 ampere and for distances greater than listed above, calculate voltage drop and size conductors for maximum three (3) percent voltage drop.
- C. Parallel Conductors: Specify that parallel conductor feeders be installed so that all runs are of identical equal length.
- D. Wire Pulling:
  - 1. Require all conductors to be pulled into conduit at the same time.
  - 2. Specify UL-listed wire pulling lubricant.
  - 3. Length of conductors at receptacles, junction, and switches: at least 6" of free conductor shall be left at each outlet, junction and switch for splices or connection of fixtures or devices. Comply with NEC Article 300.
  - 4. Install box connectors and bushings at points where wiring enters conduit, raceways, equipment or panels.
  - 5. All wires within multi-conductor wiring shall remain within the jacket except at splice points and terminations.
  - 6. No uncovered (out of jacket) conductor shall be exposed or run through conduit or raceways.
- E. Wiring Connections And Terminations:
  - 1. Require that wires be thoroughly cleaned before installing lugs or connectors.
  - 2. Specify a grounding conductor(s) in all branch circuit raceways. Conduit shall not be used as a grounding conductor.
  - 3. For all new work, conduit shall not be used as a grounding conductor.
- F. Metal Clad Cable:
  - 1. For new construction, only to be used under the following conditions:
    - a) Lighting fixture whip connections of 6 feet or less.
    - b) Branch circuits from accessible ceiling down wall to devices (not for entire run of branch circuit).
    - c) Not to be used in any exposed or outdoor locations.
  - 2. For remodel construction, only to be used under the following conditions:
    - a) Lighting fixture whip connections or 6 feet or less.
    - b) Where concealed in existing walls.
    - c) Where concealed in existing hard lid ceiling spaces where "fished" to point of connection.
    - d) Not to be used as a replacement for conduit in accessible ceilings.
    - e) Not to be used in any exposed or outdoor locations.

#### **3.02 FIELD QUALITY CONTROL**

- A. The contractor shall hire an independent testing agent to conduct operating and acceptance tests on service and distribution feeders.
- B. Prior to energizing, all feeders from transformers, switchboards, and building service cables, are to be tested with a 500-volt insulation megohm meter to determine insulation resistance levels to assure requirements are fulfilled. All field test data is to be recorded in writing and submitted to the DPS. Test is to include meggering for one minute between conductors and between each conductor and ground. Cables are to be megered after insulation with cables disconnected at both ends. The value must not be less than as follows:

Conductor Size	Resistance
<u>(AWG or MCM)</u>	<u>(Megohms-1,000 ft)</u>
#16 AWG to #8 AWG	200
#6 awg to #2/0 AWG	100
#3/0 AWG to 500 kcmil	50

**3.03 REMODEL PROJECTS**

- A. Aluminim Wire and Cable:
  - 1. Replace existing aluminim wires/cables with copepr wires/cables. (Where funding is not available for the replacement, the aluminim wires/cables shall be documented to DPS for future action.)
- B. Existing Feeders:
  - 1. Where existing feeders are not planned for replacement, contractor shall perform a one (1) minute, 500VDC meggar test to check the integrity of the insulation. Record test results and submit to DPS for record purposes.

**END OF SECTION 26 05 19**