SECTION 26 0519

WIRES AND CABLES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wire and cable rated 600 volts and less.

B. Types MC, AC, and NM cables are not permitted.

1.2 RELATED SECTIONS

A. Conduits: Section 26 0533.

B. Surface metal raceways: Section 26 0535.

1.3 REFERENCES

A. ANSI/NEMA WC 70: Power Cables rated 2000 Volts or Less for Distribution of Electrical Energy.

B. ASTM B3: Standard Specification for Soft or Annealed Copper Wire.

C. ASTM B8: Standard Specification for Concentric-Lay-Stranded Copper Conductors.

D. UL 44: Standard for Thermoset-Insulated Wires and Cables.

E. UL 83: Standard for Thermoplastic-Insulated Wires and Cables.

F. Additional UL Standards as indicated.

1.4 SUBMITTALS

A. Product data:

1. Each type of wire and cable, including accessories.
2. Include copies of UL certifications showing compliance with requirements in “Quality Assurance” below.

1.5 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. Products and installation shall comply with NFPA 70 and other applicable national, state, and local electrical codes.

1.6 DELIVERY, STORAGE, AND HANDLING

A. General requirements: Deliver, store, and handle wire and cable in accordance with the manufacturer’s instructions.

1. Wire and cable shall be packaged in a manner that protects them during ordinary handling and shipping. Ship from manufacturer with ends temporarily sealed against moisture.

2. Protect wire and cable during storage (both onsite and offsite).

   a. Store in a clean and dry location. Elevate from surfaces where water can accumulate, and cover cable rolls to protect against weather.

3. Handle wire and cable as recommended by the manufacturer. Do not pull from the center or periphery of the cable reel.
4. Damaged wire and cable shall be removed from the project site.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE (600 VOLTS MAXIMUM)

A. Conductors: UL listed and NEMA WC 70 compliant; Copper, 98 percent conductivity, suitable for 600-volt duty; rated 90-degree Celsius temperature for wet/dry applications; solid bare annealed copper for No. 10 and smaller complying with ASTM B 3, and stranded for No. 8 and larger complying with ASTM B 8.

B. Conductor insulation: Type THHN / THWN-2: Comply with UL 83; PVC insulation, nylon jacket.

C. Conductor identification: Markings along outer braid denoting conductor size, voltage classification, type of insulation, and manufacturer's trade name, and color code. Identification shall extend to branch circuits and outlets. Use the color coding system tabulated below throughout the building's network of feeders and circuits, unless otherwise required by the authority having jurisdiction.

   1. Colors on conductors No. 10 and smaller, or No. 6 and smaller for grounded and grounding conductors: Solid colored insulation.
   2. Colors on conductors No. 8 and larger, or No. 4 and larger grounded and grounding conductors: Colored tape wrapped a minimum of 6 inches (150 mm) on either end of conductor.

COLOR CODE (600 volts maximum)				
VOLTAGE	NEUTRAL	PHASE		
		A	B	C
120 volts, 2-wire	White	Black, Red, or Blue depending on phase		
277 volts, 2-wire	Gray	Brown, Orange, or Yellow depending on phase		
208 volts, single-phase, 2-wire		Black/Red, Red/Blue, or Blue/Black		
208/120 volts wye, 3-phase, 4-wire	White	Black	Red	Blue
480/277 volts wye, 3-phase, 4-wire	Gray	Brown	Orange	Yellow
480 volts delta, 3-phase, 3-wire		Brown	Orange	Yellow

B. Wires used solely for grounding purposes shall be green, where insulated.

C. Control wiring shall be coded with colors different from those used to designate phase wires.

2.2 WIRING ACCESSORIES

A. Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service where installed.

B. Compression connectors: Color-keyed, Ideal Industries, Inc., wingnuts, 3M Company "Scotchlock", or equal by Thomas & Betts Corporation.

C. Compression taps: Series CT-2 tap with CT-2C cover, or Series 54710 color-keyed compression taps, Burndy Corporation "Versitap" or equal by OZ/Gedney.

D. Make splices in underground junction boxes with waterproof splice kits.

E. Power distribution blocks: Equal to FCI Burndy "U-Blok."

F. H. Multi-tap connectors, clear insulated: Equal to Burndy Corporation "UNITAP" or Ilsco "Cleartap".

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. Provide wire and cable indicated in accordance with national, state, and local electrical codes.

B. Conceal wire and cable in new construction and in locations with finished walls, ceilings, and floors unless otherwise noted on drawings.

C. Wire and cable serving systems over 100 volts shall be installed in raceways, except where otherwise noted on drawings.

D. Wire and cable serving systems rated below 100 volts shall be installed in raceways.

3.2 INSTALLING INTERIOR WIRING

A. Sizes: Minimum sizes shall be as follows, unless a larger size is indicated on the drawings.

1. 120-volt branch circuits:

a. Homerun from first outlet to panel: No. 12 when run is 50 feet or less; No. 10 when run is between 50 feet and 100 feet; No. 8 when run is more than 100 feet.
b. First outlet to other outlets: No. 12.

2. Exit light and emergency lighting circuits: No. 10. Do not install in raceways, outlet boxes, or other locations with non-emergency wiring systems.
3. Other systems (over 100-volts): Minimum No. 12 unless specified or shown on drawings to be smaller.

B. Wiring methods and locations: Wires and cables shall be installed based on the following requirements, unless otherwise noted.

1. Feeders and branch circuits: Type THHN / THWN-2, single conductors in raceway.

C. Splicing shall be done in outlet boxes and junction boxes and not in conduit.

1. Conductors No. 8 and larger: Terminated, spliced and taped, wherever practical, with compression connectors or solderless connectors. Use tools recommended by the manufacturer.
2. Splices in conductors No. 10 and smaller, including lighting fixtures: Made with wire connectors.
3. Taps in conductors No. 6 and larger: Made with compression taps or power distribution blocks.

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D. Wiring in high ambient temperature areas shall be of types required by NFPA 70.

E. Wires shall be neatly shaped in panels, wireways, boxes, and appurtenances.

3.3 COORDINATION WITH DEVICES AND EQUIPMENT

A. Where conductor size or parallel conductors shown on drawings connect to terminals on devices or equipment which is not sized for the connection:

1. Provide a junction box as near the equipment as possible but no more than 10 feet (3 m) away. Obtain approval of location before installing.
2. Provide conductor(s) sized to the ampacity of the equipment, from equipment to junction box.
3. In the junction box, splice the conductors from the equipment to the conductors of sizes, or parallel conductors, shown on the drawings.

3.4 INSTALLING CABLE RATED BELOW 100 VOLTS

A. Install in raceway.

B. Comply with requirements for raceways and boxes specified in Section 26 0533, Conduits, and Section 26 0534, Boxes.

1. Provide separate conduit systems for each low-voltage system.
2. Pull cables without exceeding cable manufacturer's recommended pulling tensions.

a. Pull cables simultaneously if more than one is being installed in same raceway.
b. Use pulling compound or lubricant, if necessary. Use compounds that will not damage conductor or insulation.
c. Use pulling means, including fish tape, cable, rope, and basket-weave wire or cable grips, that will not damage cables or raceway.

C. Avoid installing near hot utilities, which might adversely affect system performance or result in damage to the cable. If cable must be placed close to such utilities, keep it separate and protect with insulation.

D. Cable bends shall have a radius not less than the value recommended by the cable manufacturer.

E. Tag cables connected to electronic equipment, to show function and the location of other end. Securely fasten labels to the cable.

END OF SECTION