SECTION 26 05 19

LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 REFERENCED DOCUMENTS

A. Comply with Division 1 - General Requirements and related documents.

B. Comply with all other Division 26 sections as applicable.

C. Refer to other Divisions for coordination of work with other portions of work.

1.2 DESCRIPTION

A. Provide systems of wires and cables for electric power, signaling and control.

B. Related work specified in other sections

1. 26 00 00 - Electrical
2. 26 05 20 - Cable Connections
3. 26 05 23 - Control Voltage Electrical Power Cables
4. 26 05 32 - Raceways
5. 26 05 33 - Boxes for Electrical Systems

1.3 QUALITY ASSURANCE

A. The equipment supplied and installed shall meet the requirements of the National Electrical Code and all applicable local codes and ordinances.

B. All equipment supplied shall be Underwriter's Laboratories Inc. listed and so labeled.

1.4 REFERENCED STANDARDS

A. ICEA 5-61-402 Thermoplastic Insulated Wire and Cable

B. ICEA 5-66-524 Cross Linked Thermosetting Polyethylene Insulated Wires and Cables

C. ICEA 5-68-516 Ethylene Propylene Rubber Insulated Wire and Cable

D. ICEA 5-19-81 Rubber Insulated Wire and Cable

E. ANSI 1581 Standard of Electrical Wires, Cables, and Flexible Cords.

F. UL 83 Thermoplastic Insulated Wires and Cables

G. UL 1569 Metal Clad Cables

H. ASTM B3 Standard Specification for Soft or annealed Copper Wire

I. ASTM B8 Standard Specification for Concentric Lay Standard Copper Conductors

1.5 SUBMITTALS

A. Submit manufacturer's product literature completely describing conductors, cable assembles, and evidence of U.L. Listing.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver conductors and cable assemblies to the project in the manufacturer's standard reels or boxes marked with conductor material, insulation type, conductor size and U.L. Label.

B. Store conductors and cable assemblies in a clean, dry location to prevent damage from moisture, dust, personnel and equipment.

C. Handle conductors and cables in a manner to prevent damage to conductor, insulation, jackets, and identifying markings.

1.7 MANUFACTURERS

A. The material shall be the product of a manufacturer with a minimum of ten years' experience in the manufacture of similar material.

B. Acceptable Manufacturers:

1. AFC Cable Systems.
2. Cerro Wire, Inc.
3. Encore Wire
4. General Cable
5. Southwire Company
6. Okonite Company

1.8 WARRANTY

A. The material shall be warranted to be free from defect and in proper working order for one year following the date of final acceptance.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Copper Conductors

1. Conductors shall be copper unless specifically noted otherwise on the Drawings.
2. Copper conductors shall be soft drawn annealed copper, minimum conductivity 98% of pure copper per ASTM ASTM-B3.
3. Sizes No. 10 AWG and smaller shall be solid conductor, single strand.
4. Sizes No. 8 AWG and larger shall be concentric lay Class B stranding.
5. Shall conform to the Conductor Properties proscribed in the NEC.

B. Insulation

1. Type THHN: 600-volt moisture and heat resistant thermoplastic rated 75 Deg.C. in wet or dry locations.
2. Type THHN-2: 600-volt moisture and heat resistant thermoplastic rated 90 Deg.C. in wet or dry location.
3. Type THWN: 600-volt moisture and heat resistant thermoplastic rated 75 Deg.C. in wet or dry.
4. Type THWN-2: 600-volt moisture and heat resistant thermoplastic rated 90 Deg.C. in wet or dry locations.
5. Type XHHW-2: 600-volt moisture resistant cross-linked polyethylene rated 90 Deg.C. in wet or dry locations.

C. Cable Assemblies:

1. Type MC Branch Circuit Cable: 600-volt, Type THHN/THWN conductors size 12 AWG through 10 AWG, including a green insulated grounding conductor, with steel interlocked armor applied over the assembly.

PART 3 - EXECUTION

3.1 USES PERMITTED

A. Unless specifically noted on the drawings, permitted by the NEC and local codes and ordinances, wiring shall be Types THHN, THHN-2, THWN, THWN-2 or XHHW-2 installed in metal raceways as specified in 26 05 32, Raceways.

B. For final connections from junction boxes mounted on the building structure to recessed lighting fixtures, and devices recessed in walls. Type MC cable assemblies shall be permitted, with the cable assembly length not to exceed respective room boundaries, and with supports as required by the NEC.

C. Where permitted by the NEC and local ordinances, Type MC Branch Circuit cable may be utilized for branch circuit wiring where concealed in stud spaces of dry wall partitions. NEC requirements for supporting cables from the structure, independent of ceiling systems or ceiling support wires will be strictly mandated. All home runs from the first box to the panelboard shall be in EMT.

D. Type MC Cable shall not be utilized in exposed areas, wet locations, or as homerun wiring to any panel or switchboard. Use in corridors shall be limited to lighting fixture whips above ceiling, no more than 6 feet in length.

3.2 COLOR CODING

A. Where available, insulation shall be color coded by factory pigmentation for each phase and each voltage system employed on the project.

B. 120/208 volt systems:

1. Phase A - Black
2. Phase B - Red
3. Phase C - Blue
4. Neutral - White
5. Ground - Green

C. 277/480 volt systems:

1. Phase A - Brown
2. Phase B - Orange
3. Phase C - Yellow
4. Neutral - Gray
5. Ground - Green

D. Switch legs, travelers and special systems shall be continuous color scheme throughout the project as selected by the Contractor.

E. Where factory pigmentation is not available, code conductors with 1-1/2" colored tape band at each terminal and at each pull or junction box.

3.3 GROUNDING CONDUCTORS

A. All branch circuits and feeders shall include an insulated equipment grounding conductor. Raceway systems shall not be used as the sole equipment grounding path without specific approval.

3.4 MULTIWIRE BRANCH CIRCUITS

A. Multiwire branch circuits shall not be permitted unless required by the device served, such as for connection to modular furniture systems or track lighting systems.

B. Where multiwire branch circuits are required, branch circuit breakers shall be two or three pole with common trip and one handle.

3.5 MINIMUM SIZE

A. Conductors shall be of the minimum size shown on the drawings, lighting and power branch circuit wiring shall be minimum No.12 AWG.

B. Feeder circuit wiring shall be sized to limit the effect of voltage drop, based on the actual installed conductor length to limit voltage drop to 2% of nominal system voltage.

C. Branch circuit wiring shall be size to limit the effect of voltage drop, based on the actual installed conductor length, to limit voltage drop to 3% or less of nominal system voltage.

D. Circuits shall be grouped in raceways and grouped together when passing through enclosures to have phases and neutral grouped together to minimize circuit reactance.

3.6 INSTALLATION

A. Examine the system in which the conductors are to be installed for defects in equipment and installation which may cause damage to the conductors, insulation, or jackets.

B. Pull a swab or mandrel through conduit systems immediately before pulling conductors to insure a full bore, clean raceway system.

C. Do not exceed the conductor manufacturer's maximum pulling force or minimum bending radius.

D. Use pulling lubricant compound where necessary and recommended by the manufacturer.

E. Conductors or cables which have insulation or jackets damaged in the pulling process shall be removed and replace with new material.

3.7 FIELD QUALITY CONTROL

A. Test all wiring insulation with a megohm meter prior to energization:

1. Phase to ground
2. Phase to phase
3. Phase to neutral
4. Neutral to ground

B. Perform test in accordance with manufacturer's recommendation and to meet manufacturer's published minimum insulation values.

C. Correct all defects revealed by such tests including replacing material with new as required.

END OF SECTION