SECTION 16120

WIRES AND CABLES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. WIRES AND CABLES.

1.02 SUBMITTALS

A. SUBMIT product information.

1.03 WIRING METHODS

A. Use PVC conduit in earth.

PART 2 - PRODUCTS

2.01 WIRE AND CABLE MANUFACTURERS
1. Cablec
2. Okonite
3. Southwire
4. Coleman
5. Or equal, approved by the Engineer.

2.02 GENERAL

A. BRANCH CIRCUITS: Flame retardant, moisture resistant, thermoplastic, Type Letter THWN, 60 degrees C maximum operating temperature, rated 600v, unless noted otherwise on Drawings. All conductors shall be copper.

B. FEEDERS: Flame retardant, moisture and heat resistant, thermoplastic, Type Letter THWN, 75 degrees C maximum operating temperature, rated 600V, unless noted otherwise on Drawings. All conductors shall be copper.

C. FLEXIBLE, HIGH TEMPERATURE, and any other special type of wire and cable shall be provided as indicated on Drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. PULLING FRICTION: Keep to a minimum using no more than the NEC allowed number of bends, as well as not to exceed maximum allowable pulling tensions derived from tables or formula provided by the several Wire Manufacturers.

B. USED APPROVED WIRE LUBRICANT of a type suitable for wire and/or raceway involved, such as Burndy "Silkon", "Albentonite", "Protectant 626", Ideal "Yellow-77", or Polywater "J".

C. FURNISH necessary reels, reel jacks and other pulling aids required to prevent damage to wires and cable.

D. DO NOT PULL WIRE until construction work in vicinity is complete enough to avoid damage to wires and cables in any manner.

E. IDENTIFY conductors with pressure sensitive tags as manufactured by Brady, when so indicated on Drawings.

F. WIRES AND CABLES REQUIRED shall be installed continuous without splice from source of supply to distribution equipment and from source of supply to motor, lighting or power outlet. In no case shall pull boxes be used for making splices; neither shall splices be installed in conduits.

G. MAKE conductor length for parallel feeders identical.

H. LACE OR CLIP groups of feeder conductors at distribution centers, pull boxes, wire ways.

I. PROVIDE copper grounding conductors and straps.

J. INSTALL wire and cable in conduit.

K. INSTALL wire in conduit runs after concrete and masonry work is complete and after moisture is swabbed from conduits.

L. SPLICE only in accessible junction or outlet boxes.

M. CONDUCTOR CONNECTIONS:
1. USE approved pressure type solderless connectors and lugs for service entrance, feeder and equipment connections.
2. CONNECTORS shall be equal to Burndy, T & B, O-Z, or Penn Union, and shall be of a type compatible to conductors, location and load.
3. NEUTRAL CONNECTIONS AND TAPS shall be made individually, in order to prevent the possibility of an "open-neutral."
4. BRANCH CIRCUIT CONNECTIONS shall be made with UL approved solderless connectors equal to Buchanan, Scotch or T & B. Fixture connections shall be equal to those made by same Manufacturers. Any type used shall not depend solely upon a single insulating material to secure connection as well as to insulate it.
5. SOLDER JOINTS using Kester 50-50 solder and approved soldering paste equal to Nokorode, will be acceptable in lieu of mechanical pressure or solderless types for branch circuit and fixture connections.
6. BUS BAR CONNECTIONS shall be bolted with adequate nonferrous bolts, washers, and lockwashers, after first either silverplating the bars or applying suitable nonoxidizing agents equal to No-Oxide.
7. LUG AND BUS BAR DRILLINGS shall be in accordance with applicable ASA/NEMA Standards. Connection bolts or screws shall be of bronze, copper, brass, or of adequately plated nonferrous material.
8. JOINTS AND TAPS shall be insulated with patented or molded plastic or insulators, or shall be taped suitably with Okonite or Scotch tapes. Tapes shall be compatible with conductor jackets, temperature, and other conditions.

N. ALL WIRE shall be color coded to indicate the various phases and neutral. Where color coding is impractical, approved 3/4 in wide tape bands, corresponding to Color Code, NEC Section 210.5, and as specified below shall be provided.
1. COLOR CODING for the various systems shall be as follows:

For 120/208 Volt System
Phase A - Black
Phase B - Red
Phase C - Blue
Neutral - White
Ground - Green

END OF SECTION

SECTION 16134

OUTLET BOXES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. OUTLET BOXES.

PART 2 - PRODUCTS

2.01 CONDUIT OUTLET BODIES:

A. MANUFACTURERS/TYPES: Where indicated and/or where desirable, conduit installations shall be made using cast iron or cast aluminum outlet bodies equal to Crouse-Hinds "condulets", Appleton "Unilets", or Pyle-National "Pylets". Such fitting shall be appropriate for location and usage. They shall be used in combination with factory or field bends when indicated and/or when advisable.

B. COMPLETE OUTLET BODIES with gaskets, covers, hubs, reducers, and other accessories.

C. FINISH: Cadmium or equal if of steel. If of aluminum, they shall be essentially "copper-free". They shall not be used on conduits of dissimilar metals, except with written permission of Architect.

2.02 GENERAL

A. BOXES: Hot-dip galvanized, deep drawn, one piece, 1.25 ozs/sq ft (381 g/sq meter) or cadmium plated, conform to UL requirements.

B. INTERIOR BOXES: Pressed sheet steel, blanked for conduit. Provide attached lugs for locating.

C. EXTERIOR BOXES: Cast, or glass fiber reinforced plastic deep type.

D. SINGLE GANG SWITCH TYPE BOXES shall be used only where so indicated and then only in case device to be used has sufficient clearance within.

E. BOXES shall be firmly supported with patented hangers or supports, except as approved otherwise.

F. BOXES shall be equal to Steel City, Appleton, or Raco and shall be galvanized or cadmium finished.

G. COVERS:
1. FLAT OR RAISED STEEL COVERS shall be used for junction outlets.
2. COVERS shall be galvanized or cadmium finish.
3. PROVIDE combination aluminum plates and plugs on boxes not furnished with a wiring device, as shown on Drawings.
4. STAINLESS STEEL SCREWS shall be used with aluminum plate assemblies.

PART 3 - EXECUTION

3.01 INSTALLATION

A. VERIFY EXACT LOCATION, mounting height and usage of each outlet box. Boxes shall be set plumb and square with building walls, floors, ceiling and other elements. Maximum tolerance shall be 1/16 inch.

B. DO NOT USE sectional or handy boxes unless specifically requested.

C. SHEET STEEL BOXES: Do not set where fixture and device requires cast or otherwise special outlet boxes.

PART 4 - LOCATION

4.01 LOCATIONS OF OUTLETS

A. STUDY Architectural, Structural and Mechanical Drawings as well as any Drawings of existing structures, prior to rough-in.

B. VERIFY exact mounting heights and exact locations for outlets. Adjust actual heights and locations to minimize masonry cutting by utilizing joints in masonry as much as possible.

C. LOCATE OUTLETS AND EQUIPMENT so as to avoid interference with building trim, door swings and other equipment.

D. STUBBING ARRANGEMENTS AND OUTLET ARRANGEMENTS: Verify for equipment connections, to be proper for equipment installed.

E. OUTLETS: Align, group and otherwise arrange in pleasing and logical arrangement with respect to architectural elements.

F. INSTALL OUTLETS flush and plumb unless otherwise noted. Long axis of a "Gang" shall be vertical except where the word "Horizontal" is noted, or unless available room dictates that outlet be set horizontally.

G. REPORT all conflict with other Trades to Architect and Contractor immediately upon discovering same.

H. CHASES AND PIPE SLEEVES: Provide Contractor with information he will need to provide necessary chases in concrete work. Furnish and set pipe sleeves as needed, verify locations with Architect.

END OF SECTION

SECTION 16190

SUPPORTING DEVICES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. CONDUIT SUPPORTS.

1.02 RELATED WORK

A. SECTION 16111: Conduit

PART 2 - PRODUCTS AND EXECUTION

2.01 CONDUIT SUPPORTS

A. SINGLE RUNS: Galvanized conduit straps or ring bolt type hangers with specialty spring clips. Don't use plumbers perforated straps.

B. MULTIPLE RUNS: Conduit rack with 25 percent spare capacity.

C. VERTICAL RUNS: Channel support with conduit fittings.

2.02 ANCHOR METHODS

A. METAL SURFACES: Machine screws, bolts or welded studs.

B. CONCRETE SURFACES: Self_drilling anchors or power_driven studs.

2.03 ANCHORS, FASTENERS AND MISCELLANEOUS SUPPORTS

A. EXPOSED CONDUIT FASTENINGS shall be made with one-piece malleable conduit clamps equal to Appleton, Steel City or Gedney. Two-hole galvanized sheet metal pipe straps may be substituted only upon application to Architect, but may be used on all concealed installations.

B. COMPANION BASES OR BACKS shall be used with conduit clamps when conduit is exposed to weather or continuous moisture.

C. SUPPORT OF ELECTRICAL EQUIPMENT AND MATERIALS: Do not hang or support electrical equipment and materials from roof decks.

END OF SECTION

SECTION 16450

GROUNDING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. POWER SYSTEM GROUNDING.

PART 2 - PRODUCTS

2.01 POWER SYSTEM GROUNDING

A. GROUND AND BOND metallic raceways, cabinets, and equipment required by NEC.

B. BONDING/GROUNDING ATTACHMENTS shall be made to conduits by means of phenolic or plastic throat, malleable iron, cadmium plated ground bushings full equal to T & B 3802 series. Grounding locknuts may be used for additional bonding, but will not be acceptable in lieu of ground bushings.

C. GROUNDING/BONDING CONDUCTORS shall be sized as indicated but in no case less than minimum NEC requirements. They shall be of soft annealed copper and shall be stranded when larger than No. 10, unless noted otherwise. They may be bare except where dangerously close to live parts, but where insulated they shall have a green color jacket or finish. When metallic conduit is used as conductor, connections shall be made tight.

D. WHEN PLASTIC CONDUIT IS USED, an extra ground wire shall be provided on each run.

E. LUGS AND FITTINGS: Grounding shall be UL approved solderless.

END OF SECTION

PRINTS ISSUED

DATE	PURPOSE	NO.
12.02.16	FOR BID	

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SE-4 OF: SE-4