

## SECTION 16110 CONDUITS AND FITTINGS

### PART 1 GENERAL

#### 1.01 SCOPE OF WORK

Furnish and install the conduits, fittings, devices and appurtenances as hereinafter specified and/or as shown on the Contract Drawings. This specification applies to both low and medium voltage systems.

#### 1.02 SUBMITTALS

The requirements of Section 01340 and Section 16050 shall be met.

#### 1.03 APPLICATIONS

- A. Except where otherwise shown on the Contract Drawings, or hereinafter specified, all wiring shall be run in rigid conduits.
- B. Rigid aluminum conduits (RAC) shall be used at all locations aboveground and within structures and buildings, except where otherwise shown on the Contract Drawings.
- C. Rigid aluminum conduits shall be used at all locations for shielded instrumentation/control and communication wiring, except where otherwise shown on the Contract Drawings.
- D. Schedule 40 PVC conduits shall be used for all power and 120V instrumentation/control wiring when used in concrete steel reinforced ductbanks and in-slab applications except where otherwise shown on the Contract Drawings. Provide conduit spacers by "Carlon" or approved equal, every 6 feet or less to hold separation of conduits.
- E. Schedule 80 PVC shall be used for all power and instrumentation/control wiring in direct bury ductbank applications except where otherwise shown on the Contract Drawings. Provide conduit spacers by "Carlon" or approved equal, every 6 feet or less to hold separation of conduits.
- F. Schedule 80 PVC conduits shall be used in highly corrosive areas such as chemical storage areas, digesters, fluoride storage and handling areas, etc.
- G. All conduits of a given type shall be the product of one manufacturer.
- H. Except where otherwise shown on the Contract Drawings, or hereinafter specified, all boxes shall be metal.
- I. Surface and flush mounted switch, receptacle and control station boxes shall be 316 Stainless Steel.
- J. Devices designated as NEMA Type 4 shall be 316 stainless steel, gasketed.
- K. Devices designated as NEMA Type 4X shall be 316 stainless steel, gasketed, except

as otherwise shown on the Contract Documents.

- L. Combination expansion-deflection fittings shall be used where conduits cross structural expansion joints or as recommended by manufacturer for ambient conditions.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

#### **A. Rigid Conduit**

1. Rigid aluminum conduit shall be Aluminum as manufactured by Allied Tube & Conduit, Patriot Aluminum Products or approved equal.
2. PVC Sch 80 & 40 conduit as manufactured by Carlon, Heritage Plastics or approved equal.

#### **B. Liquidtight, Flexible Conduit**

1. Liquidtight, flexible metal conduits shall be Sealtite, Type UA, as manufactured by Anaconda, American Flexible Conduit Co., Inc., or approved equal.
2. Liquidtight, flexible non-metallic conduits shall be Carflex Liquidtight Flexible Non-Metallic Conduit as manufactured by Carlon, or approved equal.

#### **C. Rigid Conduit Fittings**

1. Rigid Aluminum Conduit Fittings:
  - a. Aluminum elbows, bends, sweeps, nipples, couplings, etc., approved equal.
2. Rigid Non-Metallic Conduit Fittings: PVC elbows, bends, sweeps, nipples, couplings, device boxes, etc., shall be Plus 80 fittings as manufactured by Carlon, or approved equal.

#### **D. Flexible Conduit Fittings**

1. Flexible Metal Conduit Fittings: Fittings used with flexible metal conduit shall be of the screw-in type as manufactured by Thomas and Betts Company, or approved equal.
2. Flexible Non-Metallic Conduit Fittings: Fittings used with flexible non-metallic conduit shall be Carflex Liquidtight Non-metallic Fittings as manufactured by Carlon, or approved equal.

#### **E. Flexible Couplings: Flexible couplings shall be as manufactured by Crouse-Hinds, Appleton Electric Company, or approved equal.**

#### **F. Wall Seals: Wall sleeves shall be used for all wall penetrations and conform to area classifications. Conduit wall seals shall be type "WSK" as manufactured by the O.Z. Electrical Manufacturing Company, or approved equal.**

#### **G. Expansion Fittings: Combination expansion-deflection fittings shall be type "XD" as**

manufactured by Crouse-Hinds, or approved equal.

H. Boxes

1. Device Boxes

- a. Flush mounted wall device boxes shall be galvanized pressed steel as manufactured by the Raco Manufacturing Company, or approved equal.
- b. Surfaced mounted wall device boxes shall be cast or malleable iron as manufactured by Crouse-Hinds, Appleton Electric Company, or approved equal.
- c. Flush mounted in-floor device boxes shall be cast metal, shall be watertight, shall have adjustable cover frames, and shall be as manufactured by Russell & Stoll Company, Steel City Electric, or approved equal.

2. Other Boxes

- a. Terminal boxes, junction boxes, pull boxes, etc., except as otherwise specified and/or shown on the Contract Drawings, shall be PVC or 316 S.S.
- b. The boxes shall have continuously welded seams and shall be ground smooth.
- c. The box bodies shall be flanged, shall be not less than 14-gauge metal, and shall not have holes or knockouts.
- d. The box covers shall be not less than 12-gauge metal, shall be gasketed, and shall be fastened to the box bodies with stainless steel screws.

I. Conduit Mounting Devices: Hangers, rods, channel, backplates, clips, straps, beam clamps, etc., shall be 316 stainless steel as manufactured by Unistrut Corp., or approved equal.

J. Fixture Support System

1. The fixture support system shall be the channel type and shall be furnished complete with all requisite mounting hardware and appurtenances.
2. The channel, mounting hardware and related appurtenances shall be 316 stainless steel.
3. The fixture support system shall be as manufactured by the Unistrut Corp., or approved equal.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. No conduit smaller than 3/4-inch electrical trade size shall be used ~~nor shall either 1-1/4-inch conduit or 3-1/2-inch conduit be used.~~—Minimum size underground, under slab or in-slab shall be 1-inch.
- B. No wires shall be pulled until the individual conduit runs are complete in all details.

Additionally, each conduit shall be cleaned and reamed and certified clear of all burrs and obstructions before any wire is pulled.

- C. The ends of all conduits shall be tightly capped to exclude dust and moisture during construction.
- D. Conduits shall be supported at intervals of 8-feet or less, as required to obtain a rigid installation. For flexible conduit supports shall be in accordance with NEC 2014 350.30, A.
- E. Exposed conduits shall be run parallel with and/or perpendicular to the surrounding surface(s). No diagonal runs will be allowed.
- F. Single conduits shall be supported by one-hole pipe clamps in combination with one-screw backplates to provide space between the conduits and the mounting surface.
- G. Multiple horizontal runs of conduits shall be supported by trapeze type hangers (channel) suspended by threaded rod, 3/8-inch minimum diameter.
- H. Multiple vertical runs of conduits shall be supported by structurally mounted channel in combination with conduit clamps.
- I. Conduit support devices shall be attached to structural steel by welding or beam or channel clamps as indicated on the Contract Drawings.
- J. Conduit support devices shall be attached to concrete surfaces by "spot type" concrete inserts.
- K. Conduits terminating in steel interior boxes shall have double locknuts and insulating bushings. Exterior conduits installed in boxes shall have sealed conduit hubs when penetrating in the top or side.
- L. Conduits terminating in gasketed enclosures shall be terminated with sealed conduit hubs weather interior or exterior.
- M. Conduit wall seals, waterproof type, shall be used at all locations where conduits penetrate walls.
- N. Liquidtight, flexible conduit - metal or non-metallic ~~as shown on the Contract Drawings~~ –shall be used for all motor terminations and for all connections/terminations where vibration is anticipated.
- O. Flexible couplings shall be used in hazardous locations for all motor terminations and for all connections/terminations where vibration is anticipated.
- P. Conduit stubouts for future construction shall be capped at both ends with threaded PVC conduit caps.
- Q. The cement used for PVC conduit installations shall be as manufactured by Carlon, or approved equal.
- R. Provide grounding type bushings for a conduit entering ~~all control~~ panels and junction

[boxes.](#)

- S. Rigid aluminum conduits entering manholes and/or below grade pull boxes shall be terminated with grounding type bushings which shall be connected to a 3/4-inch by 10-foot long driven ground rod with No. 6 AWG bare copper wire.
- T. Rigid aluminum conduit shall be used for all risers. The underground portion of the riser and a 6-inch section of the riser immediately above the ground or slab/floor level shall be painted with a bitumastic coating. All below grade conduit [and conduit](#) sweeps shall be [PVC coated](#) metallic [or 40mil](#) ~~with~~ bitumastic coating. No aluminum conduit is to come into direct contact with concrete or earth.

### 3.02 **GUARANTEES AND WARRANTIES**

The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

**END OF SECTION**