

## SECTION 16111

### CONDUIT AND FITTINGS

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDED

A. Furnishing and installing of complete systems of electrical conduits as part of the raceway systems for installation of conductors for electrical systems.

##### 1.02 REFERENCE DOCUMENTS

A. The Special Provisions for electrical work are hereby made a part of this section of the work. Refer to Section 16010.

B. See Section 16190 for Supporting Devices.

##### 1.03 SUBMITTALS

A. Submit complete manufacturers' specifications data on each type and manufacture of conduit and fitting proposed to be furnished and/or installed on the project.

##### 1.04 QUALITY ASSURANCE

A. Conduits shall be accord with ANSI Standard C 80.

B. Each length of conduit shall bear the UL Label.

#### PART 2 - PRODUCTS

##### 2.01 RIGID METALLIC CONDUITS AND FITTINGS

A. Rigid metallic conduit shall be standard hot-dipped galvanized mild rigid steel. Conduit shall have galvanized threads. Each length shall be provided with a coupling and ends without couplings shall be furnished protected with a suitable covering. All bends in conduit one and one-quarter inch (1-1/4") in size and larger shall be made with factory manufactured elbows. Rigid metallic conduit shall be equal to Republic Galvite Rigid Steel Conduit.

B. Locknuts and bushing shall be galvanized steel except O. Z. Manufacturing Company Type "A", or approved equal molded canvas bakelite bushings may be used for 2" trade size and O. Z. Type "B" bakelite insulated, lined steel bushings may be used for conduits two and one-half inches (2-1/2") and larger.

## 2.02 INTERMEDIATE METALLIC CONDUIT (IMC.)

- A. Intermediate metal conduit shall be hot-dipped galvanized steel tubing with galvanized threads equal to IMC manufactured by Allied Tube and Conduit Corporation.
- B. Fittings and accessories shall be the same as set forth for rigid metallic conduit.

## 2.03 ELECTRICAL METALLIC TUBING AND FITTINGS

- A. Electrical metallic tubing shall be standard galvanized E.M.T. equal to Republic Electrinite E.M.T.
- B. Couplings and connectors for EMT shall be T & B or equal, steel set screw type with steel gland nuts. Connectors shall be uninsulated throat type. Indentor fittings are prohibited.
- C. Painting of conduit inside dialysis counter.

## 2.04 FLEXIBLE METAL CONDUIT AND FITTINGS

- A. Flexible metal conduit shall be Triangle Conduit and Cable Company or equal, spirally wound galvanized steel.
- B. Terminators of flexible steel conduit shall be T & B or equal "Tite-Bite" insulated connectors and T & B or equal, "Tite-Bite" combination couplings.

## 2.05 LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT AND FITTINGS

- A. Liquidtight flexible metal conduit shall be equal to American Brass "Sealtite" Type UA, light gray color.
- B. Terminators shall be T & B or equal, insulated throat screw-in ground cone connectors.

## 2.06 SPECIAL FITTINGS

- A. Split couplings shall be O.Z. or equal, Manufacturing Company Type SP.
- B. Expansion joints shall be O.Z. or equal, Manufacturing Company Type AX expansion joints with Type AJ bonding jumpers.
- C. Pull rope shall be 3/16" polyester stranded JET LINE rope.

## 2.07 RIGID PVC CONDUITS AND FITTINGS

- A. Codes and standards shall conform with U.L.-651 and NEMA TC-2 and shall be listed and labeled by the Underwriters Laboratories Inc.

- B. PVC conduit and fittings shall be equal to Carlon "Plus 40" systems. They shall be designed for use underground, shall be non-conductive and shall assure a safe system. Conduits and fittings shall be non-corrosive, impervious to most chemicals, provide lower expansion and contraction features, and shall be suitable for direct earth burial or encasement in concrete.
- C. PVC conduit and fittings shall be rated for 90 degree centigrade conductors or cable, and for use in direct sunlight.

## 2.08 RIGID PVC FITTINGS

- A. Codes applicable to PVC conduit shall also apply to PVC Fittings.
  - 1. Expansion couplings equal to Carlon E945 or E955 as required.
  - 2. Bell ends equal to Plus 80 or 40 plain bell for use with non-metallic solvent welds.
  - 3. Standard couplings socket type for solvent cement attachment.
  - 4. PVC rigid adapters E942 or E943 threaded to metallic systems and socket attachment by solvent cement.

## PART 3 - EXECUTION

### 3.01 MATERIAL SELECTION

- A. Raceways shall be standard galvanized steel rigid metal conduit unless otherwise indicated.
- B. Intermediate metal conduit (IMC) may be used wherever rigid conduit is required except for raceways embedded in concrete slabs, in contact with the earth, underground not encased in concrete and in corrosive locations.
- C. Aluminum rigid metal conduit may be used wherever rigid conduit is required except embedded in concrete slabs or underground.
- D. Electrical Metallic Tubing (EMT) may be used for raceways above furred ceilings, within dry wall partitions, exposed in rooms with exposed construction and in mechanical and electrical rooms for sizes of four inches (4") and smaller except that feeder conduits of EMT of three inch (3") and larger shall contain a green grounding conductor.
- E. Wiring connections to motors, transformers, or other devices, which are subject to vibration or require adjustment shall be flexible metallic conduit.

The flexible conduit shall be more than 12 diameters but less than 18 diameters in length. Where these connections are outdoors, or in damp locations, or are

connections to any kitchen or water treatment equipment, liquid-tight flexible conduit shall be used.

- F. Wiring to each recessed lighting fixture shall be run in an independent length of flexible conduit extended from an accessible junction box located above the ceiling. The flexible conduit shall be of sufficient length to allow the connection point to the fixture to drop at least 12" below the finished ceiling, and shall be at least 48" long but not more than 72" long. Recessed lighting fixtures which have UL approved prewired circuit junction boxes and fixture wire extensions may be used and wired directly to the branch circuit runs without the added flexible conduit connections.
- G. Elbows shall be of the same materials as the conduit. Elbows in EMT and small rigid conduits three-quarters (3/4") and under may be job-fabricated with a bender made specifically for the purpose.
- H. Conduits shall be sized as indicated on the drawings and as required to accommodate the wires to be pulled into the conduit. Conduit shall not be less than three-quarters inch (3/4") in size except EMT for branch circuit runs may be one-half inch (1/2") and three-eighths inch (3/8") flexible metallic conduit may be used for individual connections to recessed lighting fixtures.

### 3.02 CONDUIT

- A. Run conduits concealed from view in all areas except in electrical and mechanical equipment rooms. Run at levels and locations to avoid interference with the structure, finished ceilings, walls and all lines of other trades requiring grading of runs. Coordinate with other trades to allow available spaces to be used in the most efficient and workmanlike manner. In general, space and routing requirements of all other trades shall take precedence over the conduit installation.
- B. Route exposed conduits parallel with or at right angles to building walls and neatly rack. Carefully lay out conduit proposed to be run within the structure such as floors, beams, roof, or walls to avoid building up the density of conduits too excessive for the construction. Relocate conduits when excessive build-up occurs.
- C. Install conduits out of close proximity to any potentially hot device, any steam pipe, hot water pipe or other heating duct or appliance. Conduit shall not be run within three inches (3") of the exterior insulation of such device, pipe or duct, except in crossing, and such crossing shall be at least one inch (1") from the cover of the device, pipe or duct crossed.
- D. Place conduits through the roof or exterior walls in time to allow the trade to seal around the raceways as work is installed. Conduits through roof shall run through galvanized pitch pans.
- E. Cover each end of each conduit with an approved capped busing as soon as the conduit is installed to prevent entry of foreign material. Conduits shall be dry and clean before wires are pulled.

- F. Locate junction boxes and raceways above accessible ceilings such as lay-in ceiling to provide adequate space for recessed fluorescent fixtures of the type specified elsewhere to be installed, in any place in the ceiling without relocating the installed raceways, boxes or support now or in the future.
- G. Arrange conduit runs within building interiors to be no longer than 80 feet between pull or junction boxes, cabinets, or circuit interrupting device enclosures unless there is no direction change and only a straight-in-line pull of wire is involved. In such straight-in-line runs between boxes, cabinets or devices, runs not exceeding 100 feet in length may be made.
- H. Non-Metallic conduit installed outdoors under concrete slabs or walkways shall have 24 inches cover and may be in contact with the earth. Conduit service laterals installed under driveways, or roadways shall be concrete encased. Support runs on PVC spacers 5'-0" center-to-center and encase in reinforced concrete duck banks. Reinforcing shall be #4 deformed longitudinal bars, one each corner, with #3 stirrups tied at 1'-0" reinforcing concrete shall cover bar minimum 2 inches around each corner face. Non-metallic conduit installed indoors shall have 12 inches cover.

### 3.03 FITTINGS

- A. Install double locknuts and a bushing at each rigid conduit termination except for terminations into threaded hubs.
- B. Wherever standard threaded couplings cannot be used, split couplings can be used.
- C. Provide expansion joints in conduits at all building expansion joints and wherever else the length of run requires.
- D. Coat all threaded connections subject to moisture or under ground with cold galvanizing before making connection up.

### 3.04 PULL ROPE

- A. Install a pull rope with each end properly marked for use and termination of the other end in each conduit installed and in which no conductors are installed under this Division of Work.

**END OF SECTION**