

RACEWAY & BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Rigid metal conduit and fittings.
- B. Non-metallic conduit and fittings.
- C. Electrical metallic tubing and fittings.
- D. Flexible metal conduit and fittings.
- E. Liquid-tight flexible metal conduit and fittings.
- F. Wall and ceiling outlet boxes.
- G. Pull and junction boxes.

1.2 RELATED WORK

- A. Section 26 05 19 - Wiring and Cable
- B. Section 26 27 26 - Wiring Devices.
- C. Section 27 15 00 – Voice-Data Wiring
- D. Section 27 15 33 – Cable Television Wiring
- E. Section 28 31 13 – Fire Alarm System Wiring

1.3 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated.
- B. ANSI C80.3 – Electrical Metallic Tubing, Zinc-Coated.
- C. ANSI/NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
- D. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
- E. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.
- F. ANSI/NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

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### 1.4 RECORD DOCUMENTS

- A. Accurately record actual locations and mounting heights of outlet, pull, and junction boxes.

### 1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

### 1.6 PROJECT CONDITIONS

- A. Verify field measurements are as shown on Drawings.
- B. Electrical boxes are shown in approximate locations unless dimensioned. Install at location required for box to serve intended purpose.

## PART 2 - PRODUCTS

### 2.1 RIGID METAL CONDUIT AND FITTINGS

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; threaded type, material to match conduit.

### 2.2 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

- A. EMT: ANSI C80.3 galvanized tubing.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB1; steel compression or set-screw type.

### 2.3 FLEXIBLE METAL CONDUIT AND FITTINGS

- A. Conduit: Steel.
- B. Fittings and Conduit Bodies: ANI/NEMA FB 1.

### 2.4 LIQUID-TIGHT FLEXIBLE METAL CONDUIT AND FITTINGS

- A. Conduit: Flexible metal conduit with PVC jacket.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB1.

### 2.5 PLASTIC CONDUIT AND FITTINGS

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- A. Conduit: NEMA TC 2; Schedule 40 PVC.
- B. Fittings and Conduit Bodies: NEMA TC 3.

### 2.6 CONDUIT SUPPORTS

- A. Conduit Clamps, Straps, and Supports: Steel or malleable iron.

### 2.7 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized steel
  - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include ½ inch male fixture studs where required.
- B. Cast Boxes: NEMA FB 1, Type FS, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.
- C. Non-Metallic Outlet Boxes: PVC Type FS, UL listed.
- D. Fire alarm system junction box covers shall be painted red.

### 2.8 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS1, galvanized steel.

## PART 3 - EXECUTION

### 3.1 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

- A. Size conduit for conductor type installed ¼-inch minimum size.
- B. Arrange conduit to maintain headroom and present a neat appearance.
- C. Route conduit parallel and perpendicular to walls.
- D. Maintain minimum 6-inch clearance between conduit and heat sources such as flues, steam pipes and heating appliances.
- E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.
- F. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.
- G. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.

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- H. Support conduit at spacing not to exceed the spacing allowed per ANSI 70.

### 3.2 CONDUIT INSTALLATION

- A. Cut conduit square using a saw or a pipe cutter; de-burr cut ends.
- B. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- C. Use conduit hubs for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.
- D. Install no more than the equivalent of three 90-degree bends between boxes.
- E. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 1-inch size.
- F. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
- G. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
- H. Provide No. 12 AWG insulated conductor or suitable nylon pull rope in empty conduit, except sleeves and nipples.
- I. Install expansion joints where conduit crosses building expansion joints.
- J. Where conduit penetrates fire-rated walls and floors, seal opening around conduit with UL listed foamed silicone elastomer compound.
- K. Wipe plastic conduit clean and dry before joining. Apply full even coat of cement to entire area that will be inserted into fitting. Let joint cure for 20 minutes minimum. Provide spacers for multiple runs of buried raceways.
- L. Where conduit(s) pass(es) from refrigerated or cooled atmosphere to warmer areas where condensation of water vapor may occur within raceways, conduit bodies sealed with "duct Seal" type compound shall be provided after conductors are installed.
- M. Flexible metal conduit shall not exceed three (3) feet in length.
- N. Where exposed ceiling structure exists in unfinished spaces, conduit shall be run on the ceiling deck parallel to ceiling joists, along the sides of primary framing members, or immediately adjacent to walls. Exposed conduit running from joist-to-joist attached to the bottom of joists will not be accepted.
- O. Where conduit is installed to be attached to metal roof deck, maintain 1-1/2" clearance between the conduit and the roof deck.

### 3.3 UNDERGROUND CONDUIT INSTALLATION

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- A. Install top of conduit minimum 30 inches below finished grade.
- B. Slope underground conduit away from building.
- C. Use rigid galvanized steel conduit long-sweeps for underground elbows in conduit sizes 2 inch and larger.

### 3.4 CONDUIT INSTALLATION OF SCHEDULE

- A. Underground Installations: Schedule 40 plastic conduit.
- B. Exposed Outdoor Locations: Rigid steel conduit.
- C. Exposed Interior Locations (unfinished spaces): Electrical metallic tubing.
- D. Connections to Motors (exterior locations): Liquid-tight flexible metal conduit.
- E. Connections to Motors (interior locations): Flexible metal conduit.

### 3.5 BOX INSTALLATION

- A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- B. Install electrical boxes to maintain headroom and to present neat mechanical appearance.
- C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- D. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- E. Install boxes with suitable firestop material to preserve fire resistance rating of partitions and other elements.
- F. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.
- G. Use flush mounting outlet boxes in finished areas.
- H. Do not install flush mounting boxes back-to-back or side-to-side in walls; provide minimum 24-inch separation. Where 24 inch separation is not physically possible, approval for closer spacing shall be obtained from the Architect prior to rough-in. In such cases, provide UL listed firestop pads for boxes.
- I. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness. Use stamped steel bridges to fasten flush mounting outlet box between studs.

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- J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- K. Use adjustable steel channel fasteners for hung ceiling outlet box.
- L. Use gang boxes where more than one device is mounted together. Do not use sectional box.
- M. Use gang box with plaster ring for single device outlets.
- N. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- O. Use either sheet metal or non-metallic outlet boxes with non-metallic sheathed cable. Use sheet metal outlet boxes with Type MC cable.
- P. Provide UL-listed fire-stop material in boxes that are recessed into fire rated walls. Refer to Architectural Contract Drawing for identification of fire walls.
- Q. Where boxes are installed to be attached to metal roof deck, maintain a 1-1/2" clearance between the box and the roof deck.

### 3.6 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- B. Position outlet boxes to locate luminaires as shown on Architect's reflected ceiling plan.

### 3.7 ADJUSTING BOXES

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closure in unused box opening.

END OF SECTION