



SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.

1.2 SYSTEM DESCRIPTION

- A. Raceway and boxes at locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.
- B. Underground, underground below slab on grade, or in slab (on or above grade): Provide concrete encased PVC Schedule 40 conduit. Provide cast metal boxes or nonmetallic pull boxes.
- C. Exterior Locations: Provide galvanized rigid steel conduit. Provide NEMA 3R stainless steel or NEMA 4 outlet, pull and junction boxes. Exterior locations are defined as any area exterior to the building envelope with at least one open wall or an open roof. This includes any areas under building overhangs.
- D. Wet Locations: Provide galvanized rigid steel conduit. Provide boxes, conduit bodies, and fittings listed for use in wet locations. Provide flush mounting outlet box in finished areas.
- E. Damp Locations: Provide galvanized rigid steel conduit or electrical metallic tubing. Provide boxes, conduit bodies, and fittings listed for use in damp locations. Provide flush mounting outlet box in finished areas. These locations include, but are not limited to, areas underneath buildings open to the outdoor environment.
- F. Dry Locations, Exposed and Concealed: Provide electrical metallic tubing conduit. Galvanized rigid steel conduit shall be used in areas subject to physical damage including all tug routes or tug areas. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas.
- G. PVC conduit is restricted to underground use and shall be concrete encased.

1.3 DESIGN REQUIREMENTS

- A. Minimum Raceway Size: 3/4 inch unless otherwise specified. 1/2 inch may be used for connections to equipment or devices which have ONLY standard 1/2 inch knockouts so equipment does not need to be field modified.

1.4 SUBMITTALS

- A. Product Data - Submit for the following:



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1. Flexible metal conduit.
2. Liquidtight flexible metal conduit.
3. Nonmetallic conduit.
4. Raceway fittings.
5. Conduit bodies.
6. Surface raceway.
7. Wireway.
8. Pull and junction boxes.

PART 2 - PRODUCTS

2.1 METAL CONDUIT

- A. Manufacturers:
 1. **Allied Tube & Conduit Corp.**
 2. **Republic Conduit.**
 3. **Wheatland Tube.**
- B. Rigid Steel Conduit: ANSI C80.1.
- C. Intermediate Metal Conduit (IMC): Rigid steel.
- D. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.
 1. Manufacturers:
 - a. **Cooper Crouse-Hinds.**
 - b. **O-Z/Gedney.**
 - c. **Thomas & Betts.**

2.2 PVC COATED METAL CONDUIT

- A. Manufacturers:
 1. **Ocal-Blue.**
 2. **Permacote.**
 3. **Plastibond.**
- B. Product Description: NEMA RN 1; rigid steel conduit with external PVC coating, 40 mil thick.



- C. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.3 FLEXIBLE METAL CONDUIT

- A. Manufacturers:
 - 1. **AFC Cable.**
 - 2. **Electri-Flex.**
 - 3. **Southwire Co.**
- B. Product Description: Interlocked steel construction.
- C. Fittings: NEMA FB 1.
 - 1. Manufacturers:
 - a. **AFC Cable.**
 - b. **Cooper Crouse-Hinds.**
 - c. **Thomas & Betts.**

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Manufacturers:
 - 1. **AFC Cable.**
 - 2. **Electri-Flex.**
 - 3. **Southwire Co.**
- B. Product Description: Interlocked steel construction with PVC jacket.
- C. Fittings: NEMA FB 1.
 - 1. Manufacturers:
 - a. **AFC Cable.**
 - b. **Cooper Crouse-Hinds.**
 - c. **Thomas & Betts.**

2.5 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 - 1. **Allied Tube & Conduit.**
 - 2. **Republic Conduit.**
 - 3. **Wheatland Tube.**



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- B. Product Description: ANSI C80.3; galvanized tubing.
- C. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron, compression type or set-screw type .
 - 1. Manufacturers:
 - a. **Cooper Crouse-Hinds.**
 - b. **O-Z/Gedney.**
 - c. **Thomas & Betts.**

2.6 NONMETALLIC CONDUIT

- A. Manufacturers:
 - 1. **Allied Tube & Conduit.**
 - 2. **Cantex.**
 - 3. **JM Eagle.**
- B. Product Description: NEMA TC 2; Schedule 40 or 80 PVC.
- C. Fittings and Conduit Bodies: NEMA TC 3.

2.7 SURFACE METAL RACEWAY

- A. Manufacturers:
 - 1. **Walker Systems Inc.**
 - 2. **The Wiremold Co.**
- B. Product Description: Sheet metal channel with fitted cover, suitable for use as surface metal raceway.
- C. Finish: Gray or Buff enamel. Stainless steel.
- D. Fittings, Boxes, and Extension Rings: Furnish manufacturer's standard accessories; match finish on raceway.

2.8 WIREWAY

- A. Manufacturers:
 - 1. **Cooper B-Line.**
 - 2. **Hubbell.**
 - 3. **Walker Systems Inc.**
- B. Product Description: General purpose, Oiltight and dust-tight, Raintight type wireway.



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- C. Cover: Hinged or Screw cover.
- D. Connector: Slip-in or Flanged.
- E. Fittings: Lay-in type with removable top, bottom, and side; captive screws drip shield.
- F. Finish: Rust inhibiting primer coating with gray enamel finish.

2.9 OUTLET BOXES

- A. Manufacturers:
 - 1. **Appleton.**
 - 2. **Raco.**
 - 3. **Steel City.**
- B. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.
 - 2. Concrete Ceiling Boxes: Concrete type.
- C. Cast Boxes: NEMA FB 1, Type FD, cast ferroalloy. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.
- D. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.10 PULL AND JUNCTION BOXES

- A. Manufacturers:
 - 1. **Appleton.**
 - 2. **Raco.**
 - 3. **Steel City.**
- B. Sheet Metal Boxes: NEMA OS 1, galvanized steel. NEMA 4 for exterior.
- C. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
 - 1. Material: Galvanized cast iron.
 - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.



PART 3 - EXECUTION

3.1 EXISTING WORK

- A. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.
- B. Remove concealed abandoned raceway to the limits of the remodel area.
- C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.
- D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.
- E. Extend existing raceway and box installations using materials and methods as specified.

3.2 INSTALLATION

- A. Ground and bond raceway and boxes.
- B. Fasten raceway and box supports to structure and finishes.
- C. Identify raceway and boxes.
- D. Arrange raceway and boxes to maintain headroom and present neat appearance.
- E. Conceal all conduits from public view unless approved by LAWA.

3.3 INSTALLATION - RACEWAY

- A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.
- B. Arrange raceway supports to prevent misalignment during wiring installation.
- C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- D. Group related raceway; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional raceways.
- E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports
- F. Do not attach raceway to ceiling support wires or other piping systems.
- G. Construct wireway supports from steel channel.



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- H. Route exposed raceway parallel and perpendicular to walls. Conduit routed at any other angles is not allowed at any time.
- I. Route raceway installed above accessible ceilings parallel and perpendicular to walls.
- J. Route conduit in and under slab from point-to-point.
- K. Maintain clearance between raceway and piping for maintenance purposes.
- L. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.
- M. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- N. Bring conduit to shoulder of fittings; fasten securely.
- O. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.
- P. Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- Q. Install no more than equivalent of four 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install hydraulic one-shot bender to fabricate factory elbows for bends in metal conduit larger than 2 inch size.
- R. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.
- S. Install fittings to accommodate expansion and deflection where raceway crosses seismic, control and expansion joints.
- T. Install suitable pull string or cord in each empty raceway except sleeves and nipples.
- U. Install suitable caps to protect installed conduit against entrance of dirt and moisture.
- V. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.
- W. Close ends and unused openings in wireway.
- X. For new construction areas route all conduit above any mechanical ductwork. Do not install below ductwork.

3.4 INSTALLATION - BOXES

- A. Install wall mounted boxes at elevations to accommodate mounting heights specified in section for outlet device.



- B. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.
- C. Orient boxes to accommodate wiring devices oriented.
- D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- E. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.
- H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- I. Install stamped steel bridges to fasten flush mounting outlet box between studs.
- J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- K. Install adjustable steel channel fasteners for hung ceiling outlet box.
- L. Do not fasten boxes to ceiling support wires or other piping systems.
- M. Support boxes independently of conduit.
- N. Install gang box where more than one device is mounted together. Do not use sectional box.
- O. Install gang box with plaster ring for single device outlets.

3.5 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements.
- B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.
- C. Locate outlet boxes within 6' of luminaires.
- D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.6 ADJUSTING

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closures in unused openings in boxes.



3.7 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish.

END OF SECTION 26 05 33