

SECTION 26 05 33

RACEWAY & BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Rigid metal conduit and fittings.
- B. Electrical metallic tubing and fittings.
- C. Flexible metal conduit and fittings.
- D. Liquid-tight flexible metal conduit and fittings.
- E. Non-metallic conduit and fittings.
- F. Fire stopping.
- G. Sealing of conduit penetrations through walls.
- H. Wall and ceiling outlet boxes.
- I. Pull and junction boxes.
- J. Cable tray.
- K. Floor boxes.

1.2 COORDINATION OF WORK PROVIDED UNDER OTHER SPECIFICATION DIVISIONS

- A. The Contractor shall coordinate requirements for conduit and boxes associated with the following:
 - 1. Telecommunications – Section 27 10 00
 - 2. Fire Alarm System – Section 28 31 13
 - 3. Door Access Controls – Section 28 13 00

1.3 RELATED SECTIONS

- A. Section 26 27 26 - Wiring Devices
- B. Section 27 10 00 – Structured Cabling System
- C. Section 28 31 23 - Fire Alarm System.

1.4 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.

1.5 SUBMITTALS

- A. Product Data: Provide dimensions, knockout sizes and locations, materials, fabrication details, finishes, and accessories, for junction and pull boxes greater than 36 sq. in size.
- B. The Contractor shall prepare coordination drawings showing the proposed routing of all exposed raceways and wiring cable trays. Drawings shall reflect other exposed utility services being installed under other Divisions, including, but not limited to:
 - 1. Sprinkler pipes
 - 2. HVAC ducts
 - 3. HVAC piping
 - 4. Roof drain pipes

1.6 PROJECT RECORD DRAWINGS

- A. Submit documents under provisions of Division 01 and Section 26 00 00.
- B. Record actual locations of underground conduits.

1.7 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. Include installation within 10 feet of location shown.

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 FB 1; steel compression type.

2.3 FLEXIBLE METAL CONDUIT AND FITTINGS

- A. Conduit: steel.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1.

2.4 PLASTIC CONDUIT AND FITTINGS

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

2.5 LIQUID-TIGHT FLEXIBLE CONDUIT AND FITTINGS

- A. Conduit: Flexible metal conduit with PVC jacket.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1.

2.6 CONDUIT SUPPORTS

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

2.7 FIRE STOP

- A. Fire stopping materials shall be NRTL listed to UL 1479 (ASTM E814). Installation methods shall conform to a UL fire stopping system. Submit specifications and installation drawings for the type of material to be used. Fire stopping materials shall be as manufactured by *3M, International Protective Coatings Corp., Specified Technologies, Inc., Carborundum Company, RayChem, Nelson Fire Stop* or approved equal.

2.8 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 FD. Provide gasketed cover by box manufacturer. Provide threaded hubs.

2.9 PULL AND JUNCTION BOXES

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

2.10 CABLE TRAY

- A. Manufacturers:
 - 1. *Thomas & Betts, AL2-4 series*
 - 2. Substitutions: Or Approved Equal.

- B. Description: Aluminum ladder tray with 4" (nom.) sides and with solid bottom. Tray shall include 9" rung spacing.
 - 1. Type 1: 6" inside width.
 - 2. Type 2: 12" inside width.

2.11 FLOOR BOXES

- A. Manufacturers:
 - 1. *Wiremold*, Model RC4 Series
 - 2. Substitutions: Or Approved Equal.
- B. Description: Poke-thru style floor box UL listed for installation in unprotected steel deck floors with concrete toppings. Floor box shall conform to standards contained in NFPA 70 Section 300-21.
- C. Floor Box Components:
 - 1. Floor box assembly shall be made up of an insert and an activation cover. Overall poke-thru assembly length shall be 16" 3/8" [416mm].
 - a. Insert: The insert body shall have the necessary channels to provide complete separation of power and communication services. There shall be one 3/4" trade size channel for power and two 1/2" trade size channels for communication cabling. The channels shall be arranged such that communication cables can be conduit protected and connected to the insert body using a die-cast zinc conduit connector with two 1/2" trade size threaded openings to accept both rigid and flexible conduit connections. The insert shall also consist of two 20-amp duplex receptacles. The four receptacles shall be prewired with six #12 AWG THHN solid conductors. Each duplex receptacle shall be wired with individual neutral and individual ground wires. The power receptacles shall be capable of being wired as standard receptacles or for isolated ground. Circuit identifiers shall be clearly marked on each duplex receptacle and a wiring diagram shall be stamped inside the junction box. The insert body shall also contain a nonmetallic bracket that will accommodate two connectivity modular inserts. The bracket shall allow the inserts to mount flush and recessed. The body shall consist of an intumescent fire stop material to maintain the fire rating of the floor slab. The intumescent material will be held securely in place in the insert body and shall not have to be adjusted to maintain the fire rating of the unit and the floor slab. The insert shall have a spring steel-retaining ring that will hold the poke-thru device in the floor slab without additional fasteners. The poke-thru insert shall also consist of a 3/4" trade size conduit stub that is connected to the insert body and a 24.5 cubic inch [402ml] stamped steel junction box for wire splices and connections. The stamped steel junction box shall also contain the necessary means to electrically ground the poke-thru device to the system ground.
 - b. Activation Cover: The trim flange shall be manufactured of die-cast aluminum alloy with a brushed aluminum finish with a lacquer sealant. A gasket shall be attached to the underside of the trim flange to maintain scrub water tightness. The trim flange shall be 8 1/4" [210mm] in diameter. The activation slide cover shall be 6 1/4" [159mm] in diameter. The activation cover shall be manufactured from textured Polycarbonate or PVC and shall be black color. The slide holder

assembly shall be flush with the floor and provide "Dead-front" protection that allows the receptacle covers to snap back into place when receptacle is not in use. A gasket shall be attached to the underside of the cover assembly to maintain scrub water tightness by preventing water, dirt, and debris from entering the power and communication compartments. The device shall also have accommodation for two communication connectors. The cover shall have individual slides that allow access to the communication connectors and will close over the connectors when not in use. Each activation cover shall also provide locations to adhere labels to identify both power and communication circuits.

- c. Communication Modules Mounting Accessories: The poke-thru device manufacturer shall provide two UTP communications devices. Communication connectors shall be capable of being installed either flush or recessed. To accommodate the communication solutions, the device shall accept discrete keystone type connectivity devices from various manufacturers. All communication inserts shall be nonmetallic. The system shall provide for connection of other modular inserts for additional communication options. The unit will also be supplied with two Category 6 keystone connectors. The unit shall also accommodate a mechanism to permit protection of communication cabling. This mechanism shall be zinc die-cast with two openings to accept both flexible and rigid conduit. Openings shall accept 1/2" trade size conduit.

PART 3 - EXECUTION

3.1 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

- A. Size conduit for conductor type installed, 3/4-inch minimum.
- B. Arrange conduit to maintain headroom and present a neat appearance.
- C. Route conduit parallel and perpendicular to walls, ceiling joists, and adjacent piping. In spaces where exposed ceiling joists exist, route conduit at ceiling deck between joists where possible. Group conduits together where multiple conduits are installed along corridors. Do not drill through joists without prior permission from Architect.
- 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.

- H. Support conduit at spacing not to exceed limits stipulated in NFPA 70.

3.2 CONDUIT INSTALLATION

- A. Cut conduit square using a saw or a pipecutter; de-burr cut ends.
- B. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- C. Use conduit hubs or sealing locknuts 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 conduit bodies to make sharp changes in direction, as around beams.
- F. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 1-inch size.
- G. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
- H. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
- I. Provide No. 12 AWG insulated conductor or suitable nylon pull rope in empty conduit, except sleeves and nipples.
- J. Install expansion joints where conduit crosses building expansion joints.
- K. Where conduit penetrates walls or floors, seal opening around conduit. Use UL listed foamed silicone elastomer compound for fire rated walls.
- L. Route conduit through roof openings for piping and ductwork where possible; otherwise, route through roof jack with pitch pocket.
- M. Do not install conduits within the poured-in-place floor slabs above grade.
- N. 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.
- O. Flexible conduit shall not exceed three (3) feet in length.
- P. Install top of underground conduit 30 inches (min.) below finished grade.
- Q. Slope underground conduit away from building.
- R. Use rigid galvanized steel conduit sweeps for underground elbows in conduit sizes 2 inch and larger.

3.3 CONDUIT INSTALLATION SCHEDULE

- A. Underground Installations: PVC Schedule 40.
- B. Exposed Outdoor Locations: Rigid steel conduit.
- C. Concealed Interior Locations: Electrical metallic tubing.
- D. Exposed Interior Locations: Electrical metallic tubing.
- E. Interior Motor Connections: Flexible metal conduit.
- F. Exterior Motor Connections: Liquid-tight flexible conduit.

3.4 FIRE STOP INSTALLATION

- A. Provide fire stop for all cables and conduits and conduit sleeves that pass through fire-rated partitions, ceilings and/or floors.

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 to preserve fire resistance rating of partitions and other elements.
- F. Align adjacent wall-mounted outlet boxes for fire alarm devices, switches, receptacle outlets, intercom call stations, telecommunications outlets, 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 in walls; provide minimum 6-inch separation. Provide minimum 24 inches separation in acoustic rated walls.
- I. Where two (2) or more single-gang boxes are to be installed side-by-side, mount boxes a stud-width apart.
- J. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- K. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- L. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

- M. Use adjustable steel channel fasteners for hung ceiling outlet box.
- N. Do not fasten boxes to ceiling support wires.
- O. Support boxes independently of conduit.
- P. Use gang boxes where more than one device is mounted together. Do not use sectional box.
- Q. Use gang box with plaster ring for single device outlets.
- R. Use cast outlet box in exterior locations and wet locations.
- S. Install knockout closure in unused box openings.
- T. Obtain approval from Architect for exact locations of floor boxes prior to installation.
- U. Install cable tray in corridors with top of tray at bottom of primary wood beams. Maintain a constant elevation of tray. Install tray with minimum of 12" clear above tray for future access along entire length of tray except where they beneath ceiling beams.
- V. Paint all exposed conduit, boxes, and cable trays to match surfaces to which they are attached. Obtain approval of paint colors from Architect.

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 Architectural Reflected Ceiling Plans.

3.7 ADJUSTING

- A. Adjust flush-mounting outlets to make front flush with finished wall material.

END OF SECTION 26 05 33