

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
 - 1. Raceways include the following:
 - a. EMT: Electrical metallic tubing.
 - b. FMC: Flexible metal conduit.
 - c. LFMC: Liquidtight flexible metal conduit.
 - d. RMC: Galvanized Rigid steel conduit.
 - e. RNC: Rigid nonmetallic conduit.
 - f. Wireways
 - g. MC Cable: Metal Clad Cable
 - 2. Boxes, enclosures, and cabinets include the following:
 - a. Device boxes.
 - b. Floor boxes.
 - c. Outlet boxes.
 - d. Pull and junction boxes.
 - e. Cabinets and hinged-cover enclosures.

1.3 SUBMITTALS

- A. Product Data: For wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

1.4 QUALITY ASSURANCE

- A. Listing and Labeling: Provide raceways and boxes specified in this Section that are listed and labeled.
- B. Comply with NECA's "Standard of Installation."
- C. Comply with NFPA 70.

1.5 COORDINATION

- A. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Galvanized Rigid Steel Conduit: ANSI C80.1.
- B. EMT and Fittings: ANSI C80.3. with plated steel hexagonal compression type fittings with insulated throats. Fittings installed in concrete or masonry shall be “concrete tight”. Fittings installed in damp locations shall be “rain tight”.
- C. FMC: Zinc-coated steel.
- D. LFMC: Liquidtight Flexible steel conduit with PVC jacket.
- E. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

2.2 NONMETALLIC CONDUIT AND TUBING

- A. RNC: NEMA TC 2, Schedule 40 or 80 PVC.
- B. RNC Fittings: NEMA TC 3; match to conduit or conduit/tubing type and material.

2.3 METAL WIREWAYS

- A. Material: Sheet metal sized and shaped as indicated.
- B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- C. Wireway Covers: Hinged type.
- D. Finish: Manufacturer's standard enamel finish.

2.4 OUTLET AND DEVICE BOXES

- A. Sheet Metal Boxes: NEMA OS 1.
- B. Cast-Metal Boxes: NEMA FB 1, Type FD, cast box with gasketed cover.

2.5 FLOOR BOXES

- A. Floor Boxes: Cast metal, fully adjustable, rectangular, removable hinged cover, provisions for power, data and AV devices. Cover to have provisions to add floor covering. Coordinate box cover type / finish with architectural floor covering schedule.

2.6 PULL AND JUNCTION BOXES

- A. Small Sheet Metal Boxes: NEMA OS 1.
- B. Cast-Metal Boxes: NEMA FB 1, with gasketed cover.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRING METHODS

- A. Outdoors: Use the following wiring methods:
 - 1. Galvanized Rigid Steel.
 - 2. Underground, RNC.
 - 3. Connection to Vibrating Equipment LFMC.
 - 4. Boxes and Enclosures: NEMA 250, Type 3R or Type 4.
- B. Indoors: Use the following wiring methods:
 - 1. Exposed: Below 8 feet above the floor: Galvanized Rigid Steel.
 - 2. Exposed: Above 8 feet above the floor: EMT with compression fittings..
 - 3. Concealed: EMT with compression fittings.
 - 4. Connection to Vibrating Equipment: FMC; except in wet or damp locations, use LFMC.
 - 5. Damp or Wet Locations: Galvanized Rigid Steel conduit.
 - 6. Lighting fixture whips: FMC
 - 7. Boxes and Enclosures: NEMA 250, Type 1.
 - 8. MC Cable: Suitable for branch circuit wiring in a limited capacity as noted. EMT conduit shall be installed from panelboard to an above ceiling in the area to be served. At that point, a transition to MC Cable is allowed for branch circuit wiring to lights, switches, receptacles, etc. within that area. Use of MC Cable shall be restricted to concealed installations where not subject to physical abuse, and where installed per NEC requirements. In no case shall MC Cable be used where exposed.

3.3 INSTALLATION

- A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.
- B. Minimum Raceway Size: 3/4-inch trade size, except 1" minimum for telecom/data outlets.
- C. In finished areas of the Building, conceal conduit unless otherwise indicated, within finished walls, ceilings, and floors. This includes all areas except for mechanical and electrical rooms.

In finished areas with open ceilings conduit shall be neatly routed perpendicular, parallel and tight to roof structure and walls and shall be painted to match the ceiling structure. Coordinate color with architect.

- D. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- E. Install raceways level and square and at proper elevations. Provide adequate headroom.
- F. Raceways Embedded in Slabs: Install in middle third of slab thickness where practical, and leave at least 1-inch concrete cover.
- G. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.
- H. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of the pull wire.
- I. Telephone and Signal System Raceways, 2-Inch Trade Size and Smaller: In addition to the above requirements, install raceways in maximum lengths of 100 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.
- J. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded flush plugs flush with floor for future equipment connections.
- K. Flexible Connections: Use maximum of 6 feet of flexible conduit for recessed and semi recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.
- L. Raceways passing through areas subjected to different temperatures where condensation could be a problem, such as in cold storage areas, or where passing from the interior to the exterior of a building, the raceway shall be sealed to prevent the circulation of warm air to a colder section of the raceway.

3.4 UNDERGROUND RACEWAYS

- A. Underground Raceways run external to building foundation walls, with the exception of branch circuit raceways, shall be encased with a minimum of three (3) inches of concrete on all sides.
- B. Encased raceways must have a minimum cover of eighteen (18) inches, except for raceways containing circuits with voltages above 600 volts, which must have a minimum cover of thirty (30) inches.

- C. All underground raceways shall be identified by underground line marking tape located directly above the raceway at 6 to 8 inches below finished grade. Tape shall be permanent, bright-colored, continuous printed, plastic tape compounded for direct burial not less than 6 inches wide and 4 mils thick. Printed legend shall be indicative of general type of underground line below.
- D. Where underground raceways are required to turn up into cabinets, equipment, etc., and on to poles, the elbow required and the stub-up out of the slab or earth shall be of rigid steel.
- E. The raceway system shall not be relied on for grounding continuity.
- F. Underground raceways entering buildings shall be sealed water tight with duct seal to prevent water from entering the building or electrical equipment through the conduit system.
- G. All outlet boxes shall be flush mounted except for those installed in electrical and mechanical rooms.

3.5 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.6 CLEANING

- A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 260533