

SECTION 26 05 33**RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS****PART 1 - DESIGN DIRECTIVES****1.1 DESIGN DIRECTIVE/CRITERIA**

- A. No raceways to be installed in poured floor slabs.
- B. Exceptions as described in this section may be approved by Dartmouth College FO&M Engineering.

PART 2 - PRODUCTS**2.1 RACEWAY REQUIREMENTS**

- A. Interior Conduit Raceway Size: $\frac{3}{4}$ -inch minimum.
 - 1. Conduit for Control or Security System Wiring: Exception for $\frac{1}{2}$ -inch may be approved by Dartmouth FO&M Engineering.
- B. Total sum of bend angles between two raceway system pull-points must not exceed 270 degrees.
- C. Color coding of raceways and boxes for Emergency power system, Fire Alarm is required.
 - 1. Emergency power system- Yellow
 - 2. Fire Alarm – Red
 - 3. See Section 26 05 30 – Identification for Electric Systems.
- D. Interior wiring for distribution and branch circuit power and lighting, fire alarm, controls, access controls and security must be in metal conduit; EMT, Rigid metal (ferrous), or IMC.
 - 1. Exceptions: Must be approved by Dartmouth FO&M Engineering.
 - a. Surface Metal Raceway may be allowed in offices, lounges, conference rooms, and classrooms.
 - b. Rigid Non-metallic conduit, schedule 40, shall be used for enclosing grounding electrode conductors throughout the building.
 - c. MC cable may be used for fire alarm wiring in small wood-framed buildings, or existing renovations where conduit installation is not feasible.
 - d. MC cable may be used for branch circuit wiring within rooms and areas, including branch circuit drops to outlet boxes. EMT shall be used for feeder wiring and branch circuit home run wiring.
- E. Data Cables: In EMT conduit from outlet box to cable tray. Conduit must be bonded to cable tray. Refer to Division 27 for minimum size and other related requirements.
- F. Raceways in mechanical and electrical rooms below 48-inches shall be Rigid Metal Conduit (ferrous).

1. Exception for using EMT conduit.
 - a. EMT is allowed in small electrical and mechanical rooms.
 - b. EMT is allowed for larger conduit sizes over 2 inches.
- G. Raceways in Exterior Locations shall be Rigid Metal Conduit (ferrous).
 1. Conduit sweeps and riser extensions of under-slab and underground raceways emerging from below slab or earth. Protect with 3M Scotchwrap 50 corrosion tape or approved equal, or non-corrosive paint coating.
 - a. Exception: Raceways serving branch circuit wiring in exterior locations where not exposed to damage may be non-metallic rigid conduit.
- H. Conduits passing through drilled holes in walls or foundations of a building below grade and include segmented link seals at exterior building penetrations shall be rigid metal conduit (ferrous).
- I. Underground Conduits and Ductbanks:
 1. Rigid Non-Metallic Conduit:
 - a. Schedule 40: Conduits in underground duct banks and under base slabs except for 90-degree bends.
 - b. Schedule 80: Conduits used underground to serve walkway and parking lot lighting or where exposed to physical damage.
 - 1) Raceway Size: 1-inch minimum.
 - 2) Minimum Depth Below Finished Grade: 24-inches.
 2. Rigid Metal Conduit:
 - a. 90-degree bends in underground conduit in duct banks:
 - b. Where entering a structure such as a building or a manhole.
- J. Medium Voltage Conductors Within Buildings: Install in rigid metal ferrous conduit.
 1. Exception: Medium voltage cable may be installed in cable tray and wrapped with fire-wrap in medium voltage electrical rooms.

2.2 GENERAL PRODUCTS

- A. Rigid metal ferrous conduit (with Dartmouth College approval):
 1. Rigid Metal Aluminum Conduit: Will not be used.
 - a. Exception: Greenhouse locations.
 2. Intermediate Metal Conduit may be allowed as a substitute for Rigid Metal Ferrous Conduit.
- B. Electrical Metallic EMT Tubing
 1. EMT Fittings: Constructed of steel. Set screw or compression type.

- a. Die-Cast Fittings: Not allowed under any circumstances.
- 2. One-Hole Straps: Heavy-duty construction.
- C. Flexible metal conduit
 - 1. Flexible metal conduit shall be used in lengths up to 6 feet where flexibility is required.
 - 2. Flexible metal conduit or MC cable with stranded conductors may be used for connection of fixtures above suspended ceilings. Each fixture shall be served by a junction box from the EMT raceway system.
 - 3. Anti-short bushings shall be installed in all flexible metal conduits at each connector.
 - 4. A separate equipment-grounding conductor shall be installed with the phase or control conductors in all flexible metal conduits regardless of the rating of the circuit.
- D. Liquid-tight flexible metal and non-metallic conduit
 - 1. Liquid-tight flexible metallic and non-metallic conduit shall be used in lengths up to 6 feet where moisture resistance and flexibility are required.
 - 2. Liquid-tight flexible metallic and non-metallic conduit shall be used for motors, motor operated valves, transformers and other electrical apparatus installed in mechanical spaces.
 - 3. Liquid-tight Flexible Non-Metallic Conduit shall be used in corrosive environments.
- E. Surface metal raceways
 - 1. Size 700 surface metal raceway shall be the smallest surface metal raceway permissible.
 - 2. Surface metal raceway size 3000 and larger shall be used to provide power and data to lab benches.
 - 3. All covers for size 3000 and larger shall be cut to size using a tool manufactured for the purpose.
 - 4. Approved manufacturers
 - a. Legrand/Wiremold
 - b. Hubbell

PART 3 - EXECUTION

- A. Panelboards installed in recessed walls and/or where conduits rise through inaccessible ceilings, shall have spare conduits (4-1" minimum) stubbed out to an accessible location.
- B. All raceways shall be installed in a neat and workmanlike manner, plumb and square with all building surfaces and finishes.
- C. Keep raceways at least 12 inches away from parallel runs of flues and steam or hot water piping.
- D. All raceways must be coordinated with other equipment especially ductwork, sprinkler piping and major mechanical components.

- E. The total number of bends between any two pull-points of a raceway system shall not exceed 270-degrees.
- F. Expansion joints (slip-fit fittings) are required on conduits transitioning from below ground.
- G. The minimum size of conduit raceway shall be 3/4". Exceptions for the use of 1/2" in control or security system wiring may be approved by Dartmouth College FO&M Engineering.
- H. Rigid Non-metallic conduit shall be assembled using cleaner, primer and cement.
- I. A separate equipment-grounding conductor shall be installed with the phase conductors in all liquid-tight flexible metal and non-metallic conduits regardless of the rating of the circuit.

END OF SECTION