

SECTION 26 05 33 - RACEWAYS

PART I - GENERAL

1.1 UTILITY PLANT APPLICATION

- A. All wiring in Utility Plants shall be in rigid conduit; EMT conduit is not allowed.

PART 2 - PRODUCTS

2.1 RACEWAYS AND CONDUITS

A. General –

1. All raceways and conduits shall be installed with fittings, hangers, and accessories that are UL listed for their application.
2. All conduits except flexible conduits shall be a minimum size of ¾”.
3. Per State of Illinois Law (30 ILCS 565/) Steel Products Procurement Act, all raceways, conduit, and fittings made of steel shall be manufactured in the United States of America.
4. Aluminum Conduits are not allowed without a written approval from F&S Engineering Quality Assurance Department.
5. Metal Clad type MC cable is not allowed without written approval from F&S Engineering Quality Assurance Department.

B. Electrical Metallic Tubing (EMT) shall be:

1. EMT shall be hot galvanized steel O.D. with a corrosion resistant I.D. coating, and shall be listed to UL Safety Standard 797 and manufactured in accordance with ANSI C80.3
2. Reamed after cutting
3. Installed above ceilings in joist spaces
4. Installed with steel, compression type, couplings and connectors with insulated throats. As manufactured by Raco, T&B, OZ-Gedney, or approved equal. Die-cast or set-screw fittings are not allowed.
5. Installed in accordance with National Electrical Code Article 358 and the UL listing information.

C. Rigid Metal Wall Conduit (Rigid) shall be:

1. RIGID Metal Conduit shall be hot-dip galvanized steel. RIGID shall be produced in accordance with UL Safety Standard #6 and ANSI C80.1 and shall be listed by a nationally recognized testing laboratory
2. Installed in concrete slabs-on-grade and walls with 1-inch minimum concrete covering.
3. Installed in exposed exterior locations above grade.
4. Reamed after cutting threads. Threads shall be field-coated with Copper Anti-Seize Lubricant paste by Permatex, or equal.
5. Running threads are not allowed. A 3 piece coupling shall be used instead.

D. Flexible Metal Conduits shall be:

1. Flexible Metal Conduit type in all dry locations with steel, insulated throat, squeeze type connectors. Installed in accordance with the National Electrical Code Article 348 and the UL listing information
2. Liquidtight Flexible Metal Conduit type in all damp or wet locations, including all exterior locations, terminated with steel, insulated throat connectors. Installed in accordance with the National Electrical Code Article 350 and the UL listing information.
3. LFMC shall be used for the final connection to all motors, and FMC or LFMC shall be used for the final connection to vibrating equipment. Only FMC is allowed inside of plenums, including connections inside Air Handling equipment.
4. Used for the final connection to all recessed fixtures.
5. FMC or LFMC used as a lighting fixture whip or equipment whip shall be no longer than 6 feet.
6. FMC or LFMC shall not be used where a flexible connection is not necessary, or where raceway does not need to be "fished" into existing work. Using FMC or LFMC to avoid making bends in EMT or Rigid conduit is unacceptable.
7. All FMC or LFMC flexible conduits shall be a minimum size of ½". 3/8" FMC or LFMC shall only be allowed for luminaire whips or when factory installed on equipment.

E. PVC Conduits

1. PVC conduit may be used only in areas where corrosive conditions make use of steel raceways impractical.
2. PVC conduit may be used under sidewalks and driveways provided it is located 24 inches below concrete. If located less than 24 inches below concrete, PVC conduit shall be encased in concrete.

2.2 CONDUIT SUPPORTS AND HANGERS

A. General

1. All conduits shall be secured and supported in accordance with the appropriate NEC Article.
2. All straps and clamps shall be UL Listed for the conduit and application.
3. Supports for suspended conduits shall be threaded steel rods.

B. Surface Mounted Conduits

Use 1-hole straps with back-spacers, strut, or minerallac-type hangars

C. Suspended Conduits

1. Individual Conduits: Use minerallac galvanized conduit clamps with proper threaded rod.
2. Two or More Conduits adjacent to each other (trapeze hanger):
 - a. Use strut-type channel constructed from 12 gauge steel hung from at least 2 rods.
 - b. Use Listed galvanized strut clamps for Rigid and EMT conduits.

PART 3 - EXECUTION

3.1 METHODS OF WIRING

- A. Grounded Metallic Conduits: All of the conductors shall be run in grounded metallic conduits. Equipment and devices installed and not constructed with enclosures suited for mounting and enclosing all live parts, shall be installed in grounded metal cabinets.
- B. Grounded Metallic Raceways: It is intended that complete grounded metallic raceways or enclosures be provided for all circuiting throughout the extent of the systems specified.

- C. Concealed: All conduits shall be run to the distribution cabinets in a neat, accurate manner and shall be installed concealed in ceiling and wall construction where possible or exposed at right angles at roof purlin and beam locations as required.
- D. Hangers: Where conduits are to be run exposed, they shall be rigidly supported or secured in place by means of hangers suited to the conditions under which they are used.
- E. Clean Conduit: All conduits shall be swabbed until all moisture and grit is removed before any wires are pulled or installed.
- F. Wire Pulling Compound: Listed Pulling Compound may be used to ease the pulling of wire or cable. Excess compound must be removed.

3.2 RACEWAYS AND CONDUITS

- A. Metallic Conduit: All conductors shall be installed in metallic conduit.
- B. Conduit Size: All conduit shall be sized according to the National Electric Code except that minimum allowable size shall be 3/4-inch, except as otherwise noted above in this standard.
- C. Conduit identification— Conduits shall be color coded as follows:
 - 1. Fire alarm systems= Red
- D. Exposed Conduits: Shall be run parallel to and plumb with adjacent surfaces.
- E. Bends: All conduit bends shall be long radius.
- F. Open Ends Plugged: All open ends of conduits shall be plugged with approved raceway closures to prevent entrance of foreign material during construction - newspapers stuffed into boxes and/or conduits will not be allowed.
- G. Rigidly Supported: All conduits shall be rigidly supported to the building structure. No tie wiring will be allowed. (See paragraph entitled *Conduit Supports & Hangers*).
- H. Ends of Conduits: All ends of conduits shall butt solidly in couplings.
- I. Coordination: Coordinate all conduit locations with other trades before roughing-in.
- J. All conduits and raceways entering a building from underground shall be sealed around the conductors using Ideal Duct-Seal, or approved equal. Empty conduits shall be plugged.
- K. Insulated Inserts: Conduit bushings shall have insulated inserts where wire sizes are number 6 or larger.
- L. Four Extra Conduits: Four 1-inch conduits shall be installed from each flush mounted panel and turned into the joist space above the panel for future use.
- M. Underground Metal Conduit: Where metal conduit is in touch with earth, it shall be PVC coated conduit with factory applied UL listed PVC coating. Threads shall be field-coated with Copper Anti-Seize Lubricant paste by Permatex, or equal.
- N. Underground Conduit entering Buildings, Manholes, etc.: Where conduits enter a concrete wall in a building, manhole, etc., it shall be in Rigid conduit. The ductbank shall have rebar dowels drilled into the concrete wall to prevent shearing of ducts due to ground settling.
- O. Medium and High Voltage Distribution Conduit: All exposed indoor medium and high voltage distribution conduits shall be a minimum of 5" galvanized steel rigid metal conduit
- P. Primary Voltage Conduit: All outdoor underground conduits for primary voltage shall be a minimum of 5" PVC conduit concrete encased. Concrete shall have a minimum of two rebars the entire length.
- Q. 600V and below Service Entrance Conduit: All underground service entrance conduits shall be a minimum of 4" PVC conduit concrete encased.

- R. Medium and High Voltage Distribution Conduit: All indoor underground medium and high voltage distribution conduits shall be a minimum of 4" PVC conduit.

END OF SECTION **26** 05 33

This section of the *U of I Facilities Standards* establishes minimum requirements only.
It should not be used as a complete specification.