

SECTION 27 05 28
PATHWAYS FOR COMMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Metal conduits and fittings.
 2. Optical-fiber-cable pathways and fittings.
 3. Hooks.
 4. Boxes, enclosures, and cabinets.
 5. Overhead Conveyance – Refer to Section 270536

1.2 ACTION SUBMITTALS

- A. Product data for each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Pathway routing plans, drawn to scale and coordinated with each other, using input from installers of items involved.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. Description: Metal raceway of circular cross section with manufacturer-fabricated fittings.
- B. General Requirements for Metal Conduits and Fittings:
1. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
 2. Comply with TIA-569-D.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. PVC-Coated Steel Conduit: PVC-coated GRC
1. Comply with NEMA RN 1.
- E. EMT: Comply with ANSI C80.3 and UL 797.
- F. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.

2. Fittings for EMT:
 - a. Material: die cast
 - b. Type: Compression.
3. Expansion Fittings: steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.

2.2 OPTICAL-FIBER-CABLE PATHWAYS AND FITTINGS

- A. Description: Fiber to be installed into Metallic conduit system or open overhead Conveyance system.

2.3 HOOKS

- A. Description: Prefabricated sheet metal cable supports for telecommunications cable.
- B. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- C. Comply with TIA-569-D.
- D. Shape: J-Hooks and U-Brackets

2.4 BOXES, ENCLOSURES, AND CABINETS

- A. Description: Enclosures for communications.
- B. General Requirements for Boxes, Enclosures, and Cabinets:
 1. Comply with TIA-569-D.
 2. Boxes, enclosures, and cabinets installed in wet locations shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for use in wet locations.
 3. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
 4. Typical Device Back-Box: Dimensions: 4 inches square by 2-1/8 inches deep with 1-Gang vertical Drywall Ring.
 5. Gangable boxes are prohibited.
- C. Metal Floor Boxes:
 1. Material: Cast metal
 2. Type: Fully adjustable
 3. Shape: Rectangular.
 4. Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 5. Electrical Contractor must coordinate cover finish color and carpet in-Lay with Architect.
- D. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast iron with gasketed cover.
- E. Cabinets:

1. NEMA Type 1 and NEMA 4, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Color must be as specified on drawings. Finish color must be included with shop drawing submittal.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

- A. Minimum Pathway Size: 3/4-inch minimum trade size for copper, and 1-inch for optical-fiber cables.
- B. Pathway Fittings: Compatible with pathways and suitable for use and location.
- C. Install surface pathways only where indicated on Drawings.

3.2 INSTALLATION

- A. Comply with the following standards for installation requirements except where requirements on Drawings or in this Section are stricter:
 1. NECA 1.
 2. NECA/BICSI 568.
 3. TIA-569-D.
- B. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.
- C. Comply with requirements in Section 078113 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings and assemblies.
- D. Comply with requirements in Section 270529 "Hangers and Supports for Communications Systems" for hangers and supports.
- E. Comply with requirements in Section 270544 "Sleeves and Sleeve Seals for Communications Pathways and Cabling" for sleeves and sleeve seals for communications.
- F. Keep pathways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.
- G. All pathway routing MUST be fully coordinated with the other trades prior to installation.
- H. Complete pathway installation before starting conductor installation.

- I. Install no more than the equivalent total of two 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.
- J. Conceal rigid conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- K. Support conduit within 12 inches of enclosures to which attached.
- L. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT.
 - 2. Use a plastic conduit bushing or insulated fitting to terminate all Low Voltage Conduit systems.
- M. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.
- N. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure, to assure a continuous ground path.
- O. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 24 inches of slack at each end of pull wire. Secure pull wire, so it cannot fall into conduit. Cap pathways designated as spare alongside pathways in use.
- P. Surface Pathways:
 - 1. Install surface pathway for surface telecommunications outlet boxes only where indicated on Drawings.
 - 2. Install surface pathway with a minimum 2-inch radius control at bend points.
 - 3. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- Q. Pathways for Optical-Fiber and Communications Cable: Install pathways, metal and rigid and flexible, as follows:
 - 1. 1-Inch trade Size and Larger: Install pathways in maximum lengths of 100 feet.
 - 2. Install with a maximum of two 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
 - 3. All LV pathways shall not exceed 100-linear feet of cable length without a junction box appropriately sized for a pull-point.
- R. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT that is located where environmental temperature change may exceed 100 deg F, and that has straight-run length that exceeds 100 feet.
 2. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- S. Hooks:
1. Size to allow a minimum of 25 percent future capacity without exceeding design capacity limits.
 2. Shall be supported by dedicated support wires. Do not use ceiling grid support wire or support rods.
 3. Hook spacing shall allow no more than 6 inches of slack. The lowest point of the cables shall be no less than 6 inches adjacent to ceilings, mechanical ductwork and fittings, luminaires, power conduits, power and telecommunications outlets, and other electrical and communications equipment.
 4. Space hooks no more than 5 feet on-center.
 5. Provide a hook at each change in direction.
- T. Mount boxes at heights indicated on Drawings. Install boxes with height measured to center of box unless otherwise indicated.
- U. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- V. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.
- W. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- X. Set metal floor boxes level and flush with finished floor surface.
- Y. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
- 3.3 CONDUIT LABELING CRITERIA:
- A. BRASS LABELING
1. All telecom backbone conduits shall be labeled at origin and destination locations with brass tag. See drawing details for more information.

- a. The electrical contractor must submit a sample mock-up of each id label type for approval prior to installation.
- B. ADHESIVE labeling:
1. Label Type: Permanent, Self-laminating, Adhesive Typewritten Stickers.
 2. Label Text Size: Minimum of 1/4” high font, block lettering, all caps.
 3. Label Color: White background with Black text
 4. Labels may not cover any manufacturer’s and UL labeling.
 5. The electrical contractor must submit a sample mock-up of each id label type for approval prior to installation.
- C. Label Products:
1. Indoor Standard Temperature Condition Conduit and Rack Labels:
 - a. Polyester Adhesive Stickers: Panduit or Brady.
 2. Indoor and Outdoor Extreme Temperature Locations such and Inside the Hot Aisle Containment Area Mechanical Spaces and Outdoor Roof-top spaces that have continuous extreme temperatures above 110-Degrees F or Below 32-Degrees F – the following label types are required.
 - a. Extreme Temp Material & Style: Label must have temperature rating of a minimum of 120 degrees Fahrenheit to withstand the application inside of the hot aisle containment (HAC) area.
 - b. Extreme Temp Cable Labels: high-temperature flame-retardant marker plates Panduit #M200X042FQT (series).
 - c. High-Temp ID label ratings
 - 1) Temperature Range: -65°F TO 275°F (-54°C TO 135°C)
 - 2) UL969 recognized file # MH14979
 - d. Extreme Temp Conduit Stickers - polyester component labels Panduit #C200X050YJT (series)
 - 1) Temperature range: -40°F to 302°F (-40°c to 150°c)
 - 2) UL969 recognized, File # MH14576 and file # MH14979
 3. Underground Brass Conduit Tags:
 - a. Material: 032-inch (20 gauge) brass with a 3/16-inch hole for mounting. 1/2-Inch-High Text.
 - b. Text: Stamped with naming convention Text CAPS
 - c. Size: 1-1/2 Inches Round.
 4. Telecom Backbone Conduit Tags:
 - a. Material: 032-inch (20 gauge) brass with a 3/16-inch hole for mounting. 1/2-Inch-High Text.
 - b. Text: Stamped with naming convention Text CAPS
 - c. Size: 1-1/2 Inches Round.
- 3.4 INSTALLATION OF UNDERGROUND CONDUIT
- A. Comply with requirements in 270210 - Underground Pathways and Structures for Communications Systems

3.5 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install manhole/handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 270544 "Sleeves and Sleeve Seals for Communications Pathways and Cabling."

END OF SECTION 27 05 28