

SECTION 270528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Metallic and nonmetallic communications conduits and fittings.
2. Cable supports and positioning devices.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" specifies firestopping for communications pathways installed by this Section.
2. Section 260526 "Grounding and Bonding for Electrical Systems" specifies grounding and bonding conductors and connectors for communications pathways installed by this Section.
3. Section 260529 "Hangers and Supports for Electrical Systems" specifies hangers and supports for communications pathways installed by this Section.
4. Section 260533.13 "Conduits for Electrical Systems" specifies the following installed by this Section:
 - a. Type EMT-S duct raceways and elbows.
 - b. Type ERM-C-S duct raceways, elbows, couplings, and nipples.
 - c. Type FMC-S duct raceways.
 - d. Type IMC duct raceways.
 - e. Type LFMC duct raceways.
 - f. Type PVC duct raceways and fittings.
 - g. Type RTRC-BG duct raceways and fittings.
 - h. Fittings for conduit, tubing, and cable.
 - i. Electrically conductive corrosion-resistant compounds for threaded conduit.
 - j. Solvent cements.
5. Section 260533.16 "Boxes and Covers for Electrical Systems" specifies the following installed by this Section:
 - a. Metallic outlet boxes, device boxes, rings, and covers.
 - b. Junction boxes and pull boxes.
 - c. Cover plates for device boxes.
 - d. Hoods for outlet boxes.
6. Section 260543 "Underground Ducts and Raceways for Electrical Systems" specifies the following installed by this Section:
 - a. Handholes and boxes for exterior underground wiring.

7. Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling" specifies sleeves and sleeve seals for communications pathways installed by this Section.
8. Section 260553 "Identification for Electrical Systems" specifies labels and warning signs for communications pathways installed by this Section.

1.02 BUY AMERICAN REQUIREMENTS

- A. Provide certificates to show that all products meet the following requirements.
 1. American Iron and Steel (AIS)
 2. Build America, Buy America Act
- B. See Supplementary Conditions for details.

1.03 ACTION SUBMITTALS

- A. Product Data:
 1. For each type of product.
 - a. Product Listing: Include copy of unexpired approval letter, on letterhead of qualified electrical testing agency, certifying product's compliance with specified listing criteria.
 - 1) If listed manufacturer differs from selling manufacture, indicate relationship between entities on submittal. Clearly indicate which entity warrants product performance and fitness for purpose.
 - 2) Listing criteria identified in approval letter must match specified listing criteria. Approval of only equipment's enclosure is not considered approval of equipment for intended application.
 - 3) Product identification in approval letter must match product branding and model numbers in submittal. Approval letters for similar products are not acceptable.

1.04 INFORMATIONAL SUBMITTALS

- A. Manufacturers' published instructions submittals.

PART 2 - PRODUCTS

2.01 METALLIC 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. ERM-C-S: Comply with ANSI C80.1 and UL 6.

D. Joint Compound for ERM-C-S: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.02 NONMETALLIC CONDUITS AND FITTINGS

A. Description: Nonmetallic raceway of circular section with manufacturer-fabricated fittings.

B. General Requirements for Nonmetallic Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
2. Comply with TIA-569-D.

C. PVC-80: Comply with NEMA TC 2 and UL 651 unless otherwise indicated.

D. Fittings: Comply with NEMA TC 3; match to conduit or tubing type and material.

E. Solvents and Adhesives: As recommended by conduit manufacturer.

PART 3 - EXECUTION

3.01 SELECTION OF PATHWAYS FOR COMMUNICATIONS SYSTEMS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NFPA 70 for selection of duct raceways. Consult Engineer for resolution of conflicting requirements.

B. Minimum Pathway Size:

1. For Copper and Aluminum Cables: Metric designator 21 (trade size 3/4).
2. For Optical-Fiber Cables: Metric designator 21 (trade size 3/4).

C. Pathway Fittings: Compatible with pathways and suitable for use and location.

1. ERM-C-S: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.

D. Temperature Limitations:

1. Type PVC: Do not install where ambient temperature exceeds 122 deg F. Conductor ratings must be limited to 75 deg C except where installed in a trench outside buildings with concrete encasement, where 90 deg C conductors are permitted.

E. Outdoor Pathways:

1. Exposed and Subject to Severe Physical Damage: ERMIC.
2. Exposed and Subject to Physical Damage: ERMIC.
 - a. Locations less than 2.5 m (8 ft) above finished floor.
3. Exposed and Not Subject to Physical Damage: ERMIC.
4. Direct Buried: PVC-80.

F. Indoor Pathways:

1. Exposed and Subject to Severe Physical Damage: ERMIC. Locations include the following:
 - a. Mechanical rooms.
2. Exposed and Subject to Physical Damage: ERMIC. Locations include the following:
 - a. Locations less than 2.5 m (8 ft) above finished floor.
 - b. Stub-ups to above suspended ceilings.
3. Exposed and Not Subject to Physical Damage: ERMIC.
4. Damp or Wet Locations: ERMIC.

G. Boxes and Enclosures:

1. Outdoors, Aboveground: UL 50E Type 4.
2. Indoors: UL 50E Type 1, except use Type 4 stainless steel units in corrosive and damp or wet locations.

H. Identification of Underground Pathways, Handholes, and Structures:

1. Use "COMMUNICATIONS" for legend on warning planks, underground warning tape, and covers.

3.02 SELECTION OF COLORS AND IDENTIFICATION MARKINGS

- A. Color Coding Scheme for Communications Cable and Terminations: Comply with BICSI N1 and TIA-598.
- B. Accessible Fittings for Raceways: Identify cover of junction and pull box of the following systems with wiring system legend and system voltage. System legends must be as follows:
 1. "COMMUNICATIONS."
- C. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- D. Locations of Underground Lines: Underground-line warning tape for communication, control wiring, and optical-fiber cable.

- E. Communications Vaults, Manholes, Handholes, and Pull and Junction Boxes: For conductors in vaults, pull and junction boxes, manholes, and handholes, use vinyl wraparound labels to identify phase.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.
- F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use write-on tags with conductor or cable designation, origin, and destination.
- G. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes with conductor designation.
- H. Conductors To Be Extended in Future: Attach write-on tags to conductors and list source.
- I. Auxiliary Electrical Systems Conductor Identification: Marker tape that is uniform and consistent with system used by manufacturer for factory-installed connections.
- J. Horizontal Cables: Label each cable with a vinyl-wraparound label.
- K. Cover Plates: Label individual cover plates with self-adhesive labels. Place label at top of cover plate. Identify cover plate in accordance with TIA-606.

3.03 INSTALLATION OF PATHWAYS FOR COMMUNICATIONS SYSTEMS

- A. Comply with manufacturers' published instructions, including limitations on distance, bends, and bend radius.
- B. 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.
 - 4. NECA 101.
 - 5. NECA 102.
 - 6. NECA 105.
- C. Special Installation Techniques:
 - 1. Complete communications raceway installation before starting conductor installation.
 - 2. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.
 - 3. Provide hangers and supports for pathways, boxes, and enclosures.
 - 4. Firestop pathway penetrations of fire-rated assemblies.
 - 5. 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..
 - 6. Arrange stub-ups so curved portions of bends are not visible above finished slab.

7. Install no more than the equivalent 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.
8. Conceal rigid conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
9. Support conduit within 12 inches of enclosures to which attached.
10. Pathways Embedded in Slabs:
 - a. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure pathways to reinforcement at maximum 10-foot intervals.
 - b. Arrange pathways to cross building expansion joints at right angles with expansion fittings. Comply with requirements for expansion joints specified in this article.
 - c. Arrange pathways to keep a minimum of 1 inch of concrete cover in all directions.
 - d. Do not embed threadless fittings in concrete unless specifically approved by Engineer for each specific location.
11. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.
12. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.
13. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus one additional quarter-turn.
14. 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.
15. Cut conduit perpendicular to the length. For conduits of 2-inch trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.
16. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 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.
17. Surface Pathways:
 - a. Install surface pathway for surface telecommunications outlet boxes only where indicated on Drawings.
 - b. Install surface pathway with a minimum 2-inch radius control at bend points.
 - c. 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.
18. Pathways for Optical-Fiber and Communications Cable: Install pathways, metal and nonmetallic, rigid and flexible, as follows:
 - a. 3/4-Inch Trade Size and Smaller: Install pathways in maximum lengths of 50 feet.
 - b. 1-Inch Trade Size and Larger: Install pathways in maximum lengths of 75 feet.
 - c. 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.

19. Install pathway-sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway-sealing fittings according to NFPA 70.
20. Install devices to seal pathway interiors at accessible locations. Locate seals, so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:
 - a. Where conduits pass from warm to cold locations.
 - b. Where an underground service pathway enters a building or structure.
 - c. Where otherwise required by NFPA 70.
21. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.
22. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
23. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.
24. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
25. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.04 PROTECTION

- A. Protect coatings and finishes of pathways, boxes, and enclosures from damage and deterioration.
 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

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