

SECTION 270528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENT

- A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed here in full.
- B. This document describes the products and execution requirements relating to Pathways for Communications Systems.
- C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.2 SUBMITTALS

- A. Provide product data from manufacturer's specifications.

1.3 WORK INCLUDED

- A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

PART 2 - PRODUCTS

2.1 APPROVED PRODUCTS

- A. Rigid/Intermediate Conduit Manufacturer(s)
 - 1. Allied
 - 2. Triangle
 - 3. Wheatland
 - 4. Youngstown
 - 5. Or Approved Equal (by Design Engineer)
- B. Non-Metallic (PVC) Manufacturer(s)
 - 1. Carlon
 - 2. Or Approved Equal (by Design Engineer)
- C. Electrical Metallic Tubing (EMT) Manufacturer(s)
 - 1. Allied
 - 2. Triangle
 - 3. Wheatland

4. Youngstown
 5. Or Approved Equal (by Design Engineer)
 - D. EMT Fittings Manufacturer(s)
 1. Thomas & Betts
 2. Steel City
 3. Or Approved Equal (by Design Engineer)
 - E. Metallic Communications Outlet Box Manufacturer(s)
 1. Steel City
 2. Raco
 3. Or Approved Equal (by Design Engineer)
 - F. Pull Box Manufacturer(s)
 1. Hoffman
 2. OZ Gedney
 3. Or Approved Equal (by Design Engineer)
 - G. Approved Cable Hanger Manufacturer(s)
 1. Erico Products – Caddy – CAT HP J-Hooks
 2. Eaton - B-Line
 - H. Approved Velcro Strap Manufacturer(s). Tie Wraps are not approved.
 1. Leviton
 2. Panduit
 3. Siemon
 4. Commscope
 5. Or Approved Equal (by Design Engineer))
 - I. Approved Surface Mounted Raceway Manufacturer(s)
 1. Coordinate with Division 26 (Electrical Contractor). Refer to Drawings.
- 2.2 CONDUIT
- A. Rigid and Intermediate Conduit
 1. Rigid conduit, intermediate conduit, couplings, locknuts, bushings, elbows and connectors shall be standard thread. All materials shall be steel. Set screw or non-threaded fittings are not permitted.
 - B. Non-Metallic (PVC) Conduit
 1. Non-metallic conduit shall be heavy wall, Schedule 40 PVC.
 2. Couplings and connectors for non-metallic conduit shall be of the same material and be the product of the same manufacturer of the conduit furnished.
 - C. Electrical Metallic Tubing (EMT)

1. Electrical metallic tubing (EMT), couplings and connectors shall be steel. Malleable iron, pressure-cast or die-cast fittings are not permitted.
2. Fittings for 2" EMT and smaller shall be steel set screw type, except where otherwise noted. Fittings for 2.5" and larger shall be steel set screw type with two (2) screws for connectors and four (4) screws for couplings. All connectors shall be insulated throat type.

D. Conduit Support

1. Individual conduit hangers shall be galvanized spring steel specifically designed for the purpose and sized appropriately for the conduit type and diameter. Support individual conduits 1-1/2 inch and smaller with 1/4-inch threaded steel rods and use 3/8-inch rods for 2 inch and larger.
2. Conduit support channels shall be 14 gauge galvanized (or equivalent treatment) channel sized for the amount of conduit to be supported. Channel suspension shall be 3/8" threaded steel rods. Attach suspension rods to structure with swivel type connectors. Conduit straps shall be spring steel type compatible with channel.
3. Conduit straps shall be single hole cast metal type or two-hole galvanized metal type. Conduit clamps shall be spring steel type for use with exposed structural steel.

E. Innerduct/Inner-Conduit Channel

1. Innerduct shall be corrugated plastic equipped with pull-string or mule tape.
2. Inner-conduit channel (MaxCell) shall be 3-channel with each channel equipped with mule tape.
3. See Drawings for innerduct / inner-conduit channel (MaxCell) details.

2.3 METALLIC COMMUNICATIONS OUTLET BOXES

- A. Metallic outlet boxes and device covers shall be galvanized steel not less than 1/16" thick.
- B. The dimensions of the metallic outlet box shall be 4 -11/16" square with a minimum depth of 2-1/8".
- C. Metallic outlet boxes shall be equipped with single device covers (or two-device covers where needed). Where installed in plaster, gypsum board, etc., covers shall be raised to compensate for the thickness of the wall finish.
- D. Where metallic outlet boxes are to be empty for future use, blank coverplates shall be used.

2.4 PULL BOXES

- A. Pull boxes shall be constructed of galvanized steel with flat, removable covers fastened with plated steel screws.
- B. Pull boxes shall be equipped with keyhole screw slots in the cover to permit removal of the cover without extracting the screws.
- C. Pull boxes shall have provisions for grounding.

- D. Pull boxes shall be provided with 25% spare extra holes punched on each side for future cabling. Provide conduit nipple and plug for all future cabling holes.

2.5 CABLE HANGERS

A. J-Hooks

- 1. J-hooks shall provide a bearing surface of sufficient width to comply with the required bend radii of high-performance cables. J-hook shall be UL-listed.
- 2. J-hooks shall have flared edges to prevent damage while installing cables.
- 3. J-hooks sized 1 5/16" and larger shall have a cable retainer strap to provide containment of cables within the hanger. The cable retainer strap shall be removable and reusable and be suitable for use in air handling spaces.

2.6 VELCRO STRAPS

A. Velcro Straps

- 1. Cables shall be fastened to support structures with Velcro straps.
- 2. Velcro straps installed in air handling spaces must be plenum-rated.
 - a. Non-plenum Tie Wrap color shall be black.
 - b. Plenum Tie Wrap color shall be red.
 - c. Non-plenum Velcro strap color shall be black.
 - d. Plenum Velcro strap color shall be red.
- 3. Tie wraps are not permitted

2.7 SURFACE MOUNTED RACEWAY

A. Surface Mounted Raceway

- 1. Coordinate with Division 26 (Electrical Contractor). Refer to Drawings.

PART 3 - EXECUTION

3.1 PENETRATIONS

- A. Holes through concrete and masonry in new and existing structures shall be cut with a diamond core drill or concrete saw upon approval of the structural engineer of record for the base of the building. Pneumatic hammer, impact electric, hand or manual hammer type drills shall not be allowed, except where permitted by the Project Manager as required by the limited working space. X-ray all floor penetrations accordingly.
- B. Holes shall be located so as not to affect structural sections such as ribs or beams.
- C. Holes shall be laid out in advance. The Project Manager shall be advised before drilling through structural sections, for determination of proper layout.
- D. Structural Penetrations: Where conduits, wireways, and other raceways pass through fire partitions, fire walls or walls and floors provide a code-compliant effective barrier against the spread of fire, smoke, and gases.
- E. All penetrations where conduit is not used shall be sleeved.

- F. No gaps or rough edges shall be allowed between the wall and conduit/sleeve.

3.2 CONDUIT SYSTEM

- A. Provide metallic conduit for cabling in exposed areas, mechanical spaces, food service areas, and elevator control rooms.
- B. Leave all empty conduits with a 200-pound test nylon cord pull line.
- C. Flattened, dented, or deformed conduits are not permitted and shall be removed and replaced.
- D. Fasten conduit support device to structure with wood screws on wood, toggle bolts on hollow masonry, anchors as specified on solid masonry or concrete, and machine bolts, clamps, or spring steel clips, on steel.
- E. Install conduit with wiring, including homeruns as indicated on the Drawings. Any change resulting in a savings in labor or materials is to be made only in accordance with a contract change. Deviations shall be made only where necessary to avoid interferences and when approved by Engineer by written authorization.
- F. Conduit shall be run parallel or at right angles to existing walls, ceilings, and structural members.
- G. Attach backbone conduits larger than one-inch trade diameter to or from structure on intervals not exceeding twelve feet with conduit beam clamps, one-hole conduit straps or trapeze type support.
- H. Where conduits must pass through structural members obtain approval of Architect or Engineer.
- I. Install all conduits or sleeves penetrating or routed within rated firewalls or fire floors to maintain fire rating of wall or floor. Conduit shall not be installed in rated floors or walls if it compromises or violates the fire rating of floor or wall. Refer to architectural documents.
- J. Provide expansion and deflection coupling where conduit passes over a building expansion joint.
- K. Service entrance conduits and feeder conduits in direct contact with earth shall be schedule 40, heavy wall PVC. All service entrance conduit elbows shall be galvanized rigid steel. Service entrance conduits installed exposed or concealed in walls or above ceilings shall be galvanized rigid steel (G.R.S.) or intermediate metal conduit (IMC). Provide concrete encasement where required or as indicated on Drawings.
- L. All other conduit, unless specified herein, shall be electrical metallic tubing (EMT). PVC conduit is not allowed in exposed or concealed areas, but only within concrete.
- M. Conduit Installations Within Slab/Floor
 - 1. Conduit shall be run following the most direct route between points.
 - 2. Conduit shall not be installed in concrete where the outside diameter is larger than 1/3 of the slab thickness.
 - 3. Conduits shall not be installed within shear walls unless specifically indicated on the Drawings. Conduit shall not be run directly below and parallel with load bearing walls.
 - 4. Protect each metallic conduit installed in a concrete slab or conduits 1-1/2 inch and smaller passing through a concrete slab against corrosion where conduit

enters and leaves concrete by wrapping conduit with vinyl all-weather electrical tape.

5. Protect all conduits entering and leaving concrete floor slabs from physical damage during construction.
 6. Provide expansion fittings in all conduits where the length or run exceeds 200 feet or where conduits pass through building expansion joints.
 7. Install all conduits penetrating or routed within rated fire floors to maintain the fire rating of the floor. Conduit shall not be installed in rated floors or walls if it compromises or violates the fire rating of the floor or wall. Refer to architectural documents.
 8. Conduits installed within concrete floor slabs that are in direct contact with grade or which penetrate the building roof shall be galvanized rigid steel (G.R.S.), intermediate metal conduit (I.M.C.), or Schedule 40, heavy wall PVC.
- N. Communications cables shall not occupy conduits with power cables.
- O. Metallic conduits shall be grounded in accordance with ANSI/TIA-607-C.
- P. Conduit runs shall not have more than two (2) 90-degree bends or an aggregate of 180 degrees of bends between pull points.
- Q. Conduit runs shall not exceed 100 feet between pulling points.
- R. Communications conduit system shall contain no condulets (also known as an LB).
- S. Rigid metal conduit (RMC) or intermediate metal conduit (IMC) shall be used for entrance conduits that exceed 50 feet into the building.
- T. Horizontal Conduits
1. Support horizontal conduits at intervals not exceeding ten feet and within three feet of each outlet, junction box, backboard, enclosure, or cabinet. Support conduits from structural steel members with spring steel type or beam conduit clamps and to non-metallic structural members with one-hole conduit straps. For exposed conduits and where conduits must be suspended below the structure, single conduit runs shall be supported from the structure by a hanger rod and conduit clamp assembly, and multiple conduits shall be supported by trapeze-type support suspended from the structure. Do not attach conduits to ceiling suspension system channels or suspension wires.
 2. For runs that total more than 100 feet in length, insert pull boxes so that no segment between boxes exceeds the 100-foot limit.
 3. Size conduit per NEC 40% fill requirements.
- U. All conduit and sleeve ends shall have snap-in bushing at each end for cable protection.

3.3 COMMUNICATIONS OUTLET BOXES

- A. Exact locations of the outlet boxes shall be coordinated with the electrical contractor and other trades.
- B. Non-metallic communications outlet boxes shall not be used.
- C. The approximate locations of the outlets are indicated in the Drawings. The exact locations of outlets shall be determined at the building. The right is reserved to

change, without additional cost, the exact location of any outlet, a maximum of 10' before it is permanently installed.

- D. Orientation of outlet boxes (horizontal or vertical) shall be as indicated on the architectural elevations. The contractor shall match the orientation of the adjacent power receptacle.
- E. The location of outlet boxes (horizontal and vertical) shall be coordinated with electrical and architectural plans.
- F. Install all outlet boxes in finished areas flush with the wall. Maintain 1/4" or less space between the outlet box front and the finished wall surface.
- G. Outlet boxes shall be firmly anchored in place and shall not depend on the cover plate to hold it secure to the wall.
- H. Outlet boxes installed back-to-back in fire-rated walls shall be separated horizontally by a minimum of 24".

3.4 PULL BOXES

- A. Pull boxes shall be secured, independent of the conduit entries into the box. Pull boxes shall be secured to the building structure. In ceiling applications, pull boxes shall not be supported with ceiling wires.
- B. Conduits entering pull boxes shall connect to pull boxes using die-cast zinc connectors.
- C. Pull boxes shall be free from burrs, dirt, and debris.
- D. Pull boxes shall be installed in accordance with ANSI/TIA-569-B.
- E. Pull boxes shall be grounded in accordance with ANSI/TIA-607-C.

3.5 CABLE HANGERS

- A. J-hooks shall only be permitted in closed, accessible ceiling spaces.
- B. Installation and configuration shall conform to the requirements of ANSI/TIA-568-C.0, ANSI/TIA-568-C.1 & ANSI/TIA-569-B, NFPA 70 (National Electrical Code), applicable local codes, and to the manufacturer's installation instructions.
- C. Install cables using techniques, practices, and methods that are consistent with Category 6A or higher requirements and that support Category 6A or higher performance of completed and linked signal paths, end to end.
- D. Install cables without damaging conductors, shields, or jacket.
- E. Do not bend cables, in handling or in installing, to smaller radii than the minimums recommended by the manufacturer.
- F. Pull cables without exceeding the cable manufacturer's recommended pulling tensions. Using pulling means that will not damage the media.
- G. Do not exceed load ratings specified by the manufacturer.
- H. Adjustable non-continuous support sling shall have a static load limit of 100 lbs.
- I. To avoid electromagnetic interference (EMI), pathways shall provide minimum clearances of four feet from motors or transformers, one foot from conduit and cables used for electrical power distribution, and five inches from fluorescent lighting.

Pathways shall cross perpendicular to fluorescent lighting and electrical power cables or conduits.

- J. Install J-hooks on 4' to 5' centers.
- K. Cables are not permitted to lay on ceiling tiles or other trade piping/ducts, etc.

3.6 VELCRO STRAPS

- A. Velcro straps shall be installed around cables at intervals of 12" minimum.
- B. Velcro Straps shall secure cables to cable trays using an "X" pattern.
- C. Do not over-cinch cables.

3.7 IDENTIFICATION

- A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION