

SECTION 27 05 28

PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Metal Conduits and Fittings.
 - 2. Nonmetallic conduits and fittings.
 - 3. Surface pathways.
 - 4. Boxes and enclosures.
- B. Related Requirements:
 - 1. Section 27 15 00, Communications Horizontal Cabling.
 - 2. Division 01, General Requirements.

1.02 SUBMITTALS

- A. Product Data: For surface pathways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

PART 2 - PRODUCTS

2.01 METAL CONDUITS AND FITTINGS

- A. General Requirements for Metal Conduits and Fittings:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Comply with TIA-569-B.
- B. Fittings for Metal Conduit:
 - 1. Fittings for EMT:
 - a. Material: Steel
 - b. Type: Compression
 - 2. Expansion Fittings: Steel to match conduit type, rated for environmental conditions where installed, and including flexible external bonding jumper.

2.02 SURFACE PATHWAYS

- A. General Requirements:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Comply with TIA-569-C.
- B. Surface Metal Pathways: Galvanized steel with snap-on covers complying with Manufacturer's standard enamel finish.
- C. Surface Nonmetallic Pathways: Two-piece construction and manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors.

2.03 BOXES AND ENCLOSURES

- A. General Requirements for Boxes: Comply with TIA-569-C.
- B. Sheet-Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

- C. Box extensions used to accommodate new building finishes to be of same material as recessed box.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Device Box Dimensions:
 - 1. Double Gang: 4-inches square by 2-1/8 inches deep.
 - 2. Single Gang: 4-inches by 2-1/8-inches by 2-1/8-inches deep.
- F. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

PART 3 - EXECUTION

3.01 PATHWAY APPLICATION

- A. Indoors: Apply pathway products as specified below unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: EMT
 - 2. Concealed in Ceilings and Interior Walls and Partitions: EMT
- B. Minimum Pathway Size for Horizontal Cabling Locations: 1-inch trade size.
- C. Minimum Pathway for Sleeving: Size all conduit sleeves at a 40-percent fill ratio.
- D. Pathway Fittings:
 - 1. Compatible with pathways and suitable for use and location.
 - 2. EMT: Use compression fittings.
- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- F. Install surface pathways only where indicated on Drawings and approved by the Owner.

3.02 INSTALLATION

- A. Comply with TIA-569-D for installation requirements.
- B. 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.
- C. Install no more than the equivalent of two 90-degree bends in any pathway run. Support conduit within 12-inches of changes in direction. Utilize long radius sweeps for all 90-degree bends.
- D. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- E. Stub-ups to Above Recessed Ceilings: Use a conduit bushing or insulated fitting to terminate stub-ups in accessible ceiling spaces.
- F. 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.
- G. Install pathways square to the enclosure and terminate at enclosures with locknuts.
- H. Surface Pathways: Install surface pathway for surface telecommunications outlet boxes only where indicated on Drawings.
- I. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound.
- J. 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:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service pathway enters a building or structure.
 - 3. Where otherwise required by NFPA 70.

- K. Mount boxes at heights indicated on Drawings in accordance with ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- L. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.

3.03 SLEEVE INSTALLATION FOR COMMUNICATIONS PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of wall assemblies of all types. Comply with Division 07, Thermal and Moisture Protection, requirements for fire rated wall penetrations.

3.04 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 07, Thermal and Moisture Protection

END OF SECTION

SECTION 27 15 00

COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Outlet Cabling
 - 2. Patch Panels
 - 3. Workstation Outlets
 - 4. Jacks and Connectors
 - 5. Patch Cords
- B. Related Requirements:
 - 1. Section 27 05 28 Pathways for Communications Systems.
 - 2. Division 01, General Requirements.

1.02 SUBMITTALS

- A. Product data for each type of product.
- B. Installer certifications.
- C. Manufacturer's warranty.

1.03 CLOSEOUT SUBMITTALS

- A. Provide test results for all horizontal cabling.
- B. Provide as-built drawings with outlet labeling for each location.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Contractor to have a minimum of one BICSI certified RCDD on staff.
- B. Installation Supervision: Installation to be under the direct supervision of Registered Technician who is to be present at all times when Work of this Section is performed at Project site.

1.05 WARRANTY

- A. Provide manufacturer's extended product warranty of no less than 20 years in length.
- B. Issue warranty to the Owner within 30 days of project completion.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site. Test each pair of UTP cable for open and short circuits prior to installation.
- B. Store materials in a location that is not subject to damage.

1.07 HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. Horizontal cabling system to follow BICSI, EIA/TIA, IEEE and ISO requirements and standards.

- B. Horizontal cabling systems consist of horizontal cabling and all associated hardware as listed in this Specification. Horizontal cabling is installed from the telecommunications room to the outlet location.

1.08 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system to comply with transmission standards in TIA/EIA-568-C.3 when tested according to procedures of this standard.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Grounding: Comply with J-STD-607-C.

PART 2 - PRODUCTS

2.01 HORIZONTAL CABLE

- A. Description: 100-ohm, four-pair, unshielded twisted pair, plenum rated, Category 6A.
- B. Color: Blue.

2.02 PATCH PANELS

- A. Rack mounted; 48 port panel capable of accepting Category 6A jacks.

2.03 WORKSTATION OUTLETS

- A. Workstation Outlets: Four port, single gang faceplate.
 - 1. Plastic Faceplate: High-impact plastic with recessed label field and clear label cover. Mounts in standard single gang box. Color to match wall finishes.
 - 2. Metal Faceplate: Stainless steel with recessed label field and clear label cover. Mounts in standard single gang box.

2.04 JACKS AND CONNECTORS

- A. Category 6A modular jack, 8-position, T568B wiring scheme.
- B. Color to match faceplate.

2.05 PATCH CORDS

- A. Factory-made, Category 6A, terminated with eight-position modular plug at each end.
- B. Patch cords to have bend-relief-compliant boots and color-coded icons to ensure Category 6A performance.
- C. Patch cords to have latch guards to protect against snagging.
- D. Provide 3-foot and 5-foot lengths.

PART 3 - EXECUTION

3.01 WIRING METHODS

- A. Install cables in pathways and cable trays per industry standards. Conceal pathways and cables except in approved unfinished spaces or above accessible ceiling spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements in Section 27 05 28, Pathways for Communications Systems.
- B. Install cabling per NEC, manufacturer's recommendations, and industry requirements.
- C. Adhere to bend radius restrictions as well as maximum pulling tension.
- D. Provide required separation distances between Category 6A cabling and electrical wiring per BICSI standards.

3.02 INSTALLATION OF CABLES

- A. General Requirements for Cabling:
1. Comply with TIA/EIA-568-C.3.
 2. Consolidation points are prohibited.
 3. Cables may not be spliced.
 4. Secure and support cables at intervals not exceeding 48-inches.
 5. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
 6. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified per BICSI standards.
 7. Do not install kinked, scored, deformed, or abraded cable. Contractor is required to remove and discard cable if damaged during installation and replace it with new cable.
- B. Horizontal Cable Installation:
1. Do not untwist Category cables more than 1/2-inch from the point of termination on each end.
 2. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 3. Suspend horizontal cable not in pathway a minimum of 12-inches above ceilings by cable supports not more than 48-inches apart.
 4. Do not run cable through structural members or in contact with pipes, ducts, or other potentially damaging items.
- C. Separation from EMI Sources:
1. Comply with BICSI TDMM and TIA-569-D for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment to be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5-inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12-inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24-inches.
 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment to be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2-inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6-inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12-inches.

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures to be as follows:
 - a. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3-inches.
 - b. Electrical Equipment Rating More Than 5 kVA: A minimum of 6-inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48-inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5-inches.

3.03 FIRESTOPPING

- A. Comply with requirements of Division 07, Thermal and Moisture Protection.

3.04 LABELING AND IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-C.
- B. Cabling Administration Drawings: Provide building floor plans with cabling labeling at each outlet.
- C. Cable Labeling and Identification:
 1. Label each cable within 6-inches of each termination in the equipment room and within 4-inches at the outlet end.
 2. Labels are to be machine printed, wrap around type. Handwritten labels are prohibited.
 3. Labels to be telecom room number, patch panel number and patch panel port number. Provide labeling matrix to the Owner for approval prior to installation.

3.05 TESTING

- A. Perform the following tests and inspections:
 1. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 2. Category 6A Performance Tests:
 - a. Test each cable from the telecom room to the outlet with a Level IV tester. Perform the following tests according to TIA/EIA-568-C requirements.
 - 1) Wire map.
 - 2) Length
 - 3) Insertion loss.
 - 4) Near-end crosstalk (NEXT) loss.
 - 5) Power sum near-end crosstalk (PSNEXT) loss.
 - 6) Equal-level far-end crosstalk (ELFEXT).
 - 7) Power sum equal-level far-end crosstalk (PSELFEXT).
 - 8) Return loss.
 - 9) Propagation delay.
 - 10) Delay skew.
 3. Provide an electronic copy of the test results to the architect with closeout documents.

- B. End-to-end cabling will be considered defective if it does not pass tests and inspections.

END OF SECTION