

SECTION 27 05 38

~~~ PROJECT NOTE ~~~~~

ARCHITECT OF RECORD/ENGINEER OF RECORD IS RESPONSIBLE FOR REVIEWING THIS SPECIFICATION SECTION IN DETAIL FOR COORDINATION WITH THE PROJECT SCOPE OF WORK.

ALL "PROJECT NOTE" TEXT IS TO BE REMOVED FOLLOWING REVIEW OF THE CONTENT OF EACH NOTE BY THE ARCHITECT OF RECORD/ENGINEER OF RECORD.

EDIT THE DOCUMENT FOOTER TO INCLUDE THE PROJECT NAME AND NUMBER.

EDIT THE DOCUMENT HEADER TO INDICATE THE "AOR PROJECT ISSUE" DATE. THE "CPS CONTROL" DATE SHOULD NOT BE EDITED.

ANY MODIFICATIONS TO THE TECHNICAL STANDARDS IN THIS SECTION - INCLUDING THE REMOVAL OR ADDITION OF MANUFACTURERS - MUST BE APPROVED BY CPS.

REQUESTS FOR MODIFICATION ARE TO BE SUBMITTED TO THE DESIGN MANAGER DURING THE DESIGN PHASE FOR REVIEW AND APPROVAL.

~~~ END OF PROJECT NOTE ~~~~~

CABLE TRAYS FOR STRUCTURED CABLING SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes metallic wire basket cable tray for routing, distribution, management and termination of communication cables.
- B. Metal cable tray systems:
 - 1. Metal wire mesh/basket cable tray.
 - 2. Mounting hardware.
 - 3. Accessories.

1.02 DEFINITIONS

- A. Refer to Section 27 05 03 - Communications General Requirements for definitions.

1.03 REFERENCE STANDARDS

- A. ASTM A510/A510M - Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel; 2013.
- B. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- C. City of Chicago Building Code - Municipal Code of Chicago for the Building Industry; 2017.
- D. NECA/BICSI 568 - Standard for Installing Commercial Building Telecommunications Cabling; 2006.
- E. NEMA FG 1 - Fiberglass Cable Tray Systems; 1993 (Revised 1994).
- F. NEMA VE 1 - Metal Cable Tray Systems; 2017.
- G. NEMA VE 2 - Cable Tray Installation Guidelines; 2013, with Errata (2016).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the arrangement of cable tray with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others. Coordinate the work with other trades to avoid installation of obstructions within cable tray required clearances.
 - 2. Coordinate arrangement of cable tray with the dimensions and clearance requirements of the actual products to be installed.
 - 3. Coordinate the work with placement of supports, anchors, etc. required for mounting.
 - 4. Notify Architect/Engineer of Record of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Preinstallation Meeting: Conduct a preinstallation meeting at least one week prior to the start of the work of this section; require attendance by all affected installers.
 - 1. Ensure required submittals have been provided with sufficient time for review prior to scheduling the preinstallation meeting.
 - 2. Review the detailed requirements for the work of this section and to review the drawings and specifications for this work. Require attendance by all affected installers including but not limited to:
 - a. Contractor's Superintendent.
 - b. Installer.
 - c. Manufacturer/Fabricator Representative.
 - d. Other affected Subcontractors.
 - e. Architect/Engineer of Record.
 - f. Board's Representative.
 - 3. Record minutes and distribute copies within five (5) days after meeting to participants as well as Architect/Engineer of Record, Board and those affected by decisions made.
- C. Sequencing:
 - 1. Do not begin installation of cables until installation of associated cable tray run is complete.

1.05 SUBMITTALS

- A. Product Data: For each type of product indicated provide manufacturer's standard catalog pages and data sheets for cable tray system components and accessories. Include dimensions, materials, fabrication details, finishes, and span/load ratings.
- B. Shop Drawings: For each type of wire basket cable tray.
 - 1. Show fabrication and installation details of wire basket cable trays, including plans, elevations, and sections of components and attachments to other construction elements. Include support system and assemblies.
 - 2. Designate components and accessories, including clamps, brackets, hanger rods, splice plates, splice-plate connectors, straight lengths, and fittings.
 - 3. Include grounding details.
 - 4. Include dimensioned plan views and sections indicating proposed cable tray routing, required clearances, and locations and details of supports, fittings, building element penetrations, and equipment connections.
 - a. Elevation of basket tray.
 - b. Locations of penetrations through partitions, both fire-rated and non-rated. Include designation for firestopping detail from UL or another qualified testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Informational Submittals:
 - 1. Qualifications: For Installer.

2. Coordination Drawings: Floor plans and sections, drawn to scale. Include scaled basket tray layout and relationships between components and adjacent structural, electrical, and mechanical elements. Show the following:
 - a. Vertical and horizontal offsets and transitions.
 - b. Clearances for access above and to side of basket tray.
 - c. Vertical elevation of basket tray above the floor.
 - d. Locations of cable dropouts.
- D. Field quality-control reports.
- E. Closeout Submittals:
 1. Project Record Documents: Record actual routing of cable tray and locations of supports.
 - a. Comply with Division 1 Section "Project Record Documents," and as required by Architect/Engineer of Record.
 2. Maintenance Data: To include in operation and maintenance manuals. Include a complete set of equipment cut sheets, part list, maintenance criteria, distributor information and service information.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Award work to a single firm regularly engaged in the installation of wire basket cable tray systems, components, and accessories similar in design and extent to that required for the project, in not less than three (3) projects of similar scope within the past three (3) years, to the satisfaction of the Architect/Engineer of Record, and whose work has resulted in construction with a record of successful in-service performance.
 1. Installer must comply with Installer Qualifications requirements within Section 27 05 03 - Communications General Requirements.
- B. Components, Devices, and Accessories: Listed and labeled by UL or another qualified testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Regulatory Requirements: Components and installation shall comply with requirements of authorities having jurisdiction.
- D. Comply with City of Chicago Building Code.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wire basket cable tray systems, including components and accessories, in original, unopened packaging.
- B. Store wire basket cable tray systems in a clean, dry, interior location, protected from moisture and the weather, away from other construction activities, and in a manner to avoid damage to the components. Stacking shall be done in accordance with manufacturer's written instructions.
- C. Keep handling on site to a minimum. Handle products carefully to avoid damage to finishes of metals.

PART 2 - PRODUCTS

2.01 CABLE TRAY SYSTEM - GENERAL REQUIREMENTS

- A. Provide new cable tray system consisting of all required components, fittings, supports, accessories, etc. as necessary for a complete system.

- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Provide cable tray system and associated components suitable for use at indicated span/load ratings under the service conditions at the installed location.
- D. Basket tray systems shall be of indicated types, sizes, and NEMA classes and shall be complete with manufacturer's recommended support system, barrier strips, dropouts, splices, fittings, conduit adaptors, hold-down devices, grommets, and blind ends as required for a complete installation and as indicated.
- E. Basket trays shall be factory-fabricated in straight segments from steel wire, formed and welded into a grid pattern; U-shaped with equal height sidewalls with continuous wire at upper edge of sidewalls; and with manufacturer's standard zinc-coated finish. Trays shall have rounded edges and smooth surfaces.
 - 1. Radial bends, allowing free-forming cable bends of 10-times cable diameter, shall be fabricated in the field from straight segments, in accordance with manufacturer's instructions. 90-degree bends are not acceptable.
- F. Basket trays shall be supported from underneath by trapeze supports with threaded rods extending to structural framing or slabs above; beam clamps; and post-installed anchors.
- G. Where required, basket trays shall be cut in the field. Offset cutting shall be utilized. Center cut cutting is not acceptable.

2.02 METAL CABLE TRAY SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide product by one of the following:
 - 1. Metal Cable Tray System:
 - a. Cablofil, a brand of Legrand North America, Inc.; CF54/300 (2-inches deep by 12-inches wide): www.legrand.us/cablofil.
 - b. Chatsworth Products (CPI); 34811-612 (2-inches deep by 12-inches wide): www.chatsworth.com.
 - c. Cooper B-Line Systems, Inc.; FT2X12X10 (2-inches deep by 12-inches wide): www.cooperindustries.com
 - d. Snake Tray; CM 801-2-12-10 (2-inches deep by 12-inches wide): www.snaketray.com
- B. Basket Tray Materials:
 - 1. Carbon steel wire; ASTM A510/A510M, Grade 1008. Wire welded, bent and surface treated after manufacture.
- C. Finishes:
 - 1. Zinc Electroplated Steel: Comply with ASTM B633, Type III, SC-1. Applied after welding and bending of wire mesh.
- D. Metal Wire Mesh/Basket Cable Tray:
 - 1. Material: Zinc electroplated steel.
 - 2. Tray Depth: 2 inches, unless otherwise noted on drawings.
 - 3. Span/Load Rating: As indicated on drawings.
 - 4. Mesh Spacing: Grid pattern; 2 by 4 inches.
 - 5. Tray Width: 12 inches, unless otherwise noted on drawings.

2.03 SOURCE QUALITY CONTROL

- A. Metal Cable Tray: Perform factory design tests in accordance with NEMA VE 1, including electrical continuity and load testing.
- B. Obtain each type of wire basket cable tray, including accessories, required for the Project from single source from single manufacturer.

2.04 BASKET TRAY ACCESSORIES

- A. General: Provide all accessories and fittings required, or recommended by tray manufacturer, for a complete and grounded wire basket cable tray installation.
- B. Fittings: Splice bars; wing splices; 90-degree splice kits; grounding bolts and clamps; grounding strap connector assemblies and hardware; horizontal adjustable kits; end and side dropout fittings; cable dropouts; and other fittings as indicated or recommended by tray manufacturer.
 - 1. Splices shall include those approved for electrical continuity (bonding).
 - 2. Provide dropouts and waterfalls at every location where cable bundles exit the tray, either to the side of or to below the tray.
- C. Supports: Wire basket cable trays shall be supported from below by manufacturer's standard support system or a modular, structural quality steel channel framing system with slotted openings to receive threaded rods, attachment nuts, bolts, clamps, support brackets, and other accessories. Supports shall receive same finish as wire basket cable tray.
 - 1. Wire basket cable trays shall be supported by trapeze hangers. Center-hung supports are not acceptable.
 - 2. Wire basket cable tray supports shall extend not less than 1-inch beyond edge of tray.
 - 3. Wire basket cable tray supports shall receive a threaded rod, not less than 1/4-inch diameter, washer, and lock nut at each end. Threaded rods shall extend, without splice, to structural framing or slab above, and to below wire basket cable tray support.
 - a. Threaded rods shall be cut immediately below lock nut, leaving three threads visible, and filed smooth.
 - 4. Provide wire basket cable tray manufacturer's standard support wall bracket when wire basket cable tray terminates at partition.
- D. Support Anchors: Provide the following, unless otherwise indicated or recommended by wire basket cable tray manufacturer.
 - 1. General: Support anchors shall be sized to support, without failure, a load equal to three (3) times the load imposed by wire basket cable tray, support framing, and cabling when tray is 100 percent full.
 - 2. Expansion Anchors: Sleeve type; fabricated from carbon steel; hot dip galvanized.
 - 3. Toggle Bolts: All-steel springhead type.
 - 4. Powder-Driven Threaded Studs: Heat-treated steel, designed specifically for the intended service.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage cable tray system has been completed.
- B. Verify that field measurements are as shown on drawings.
- C. Verify that the dimensions and span/load ratings of cable tray system components are consistent with the indicated requirements.

- D. Verification of Conditions: Verify that mounting surfaces are ready to receive cable tray and associated supports. Verify that conditions are satisfactory for installation prior to starting work.
- E. Notify Architect/Engineer of Record of conditions that would adversely affect installation or subsequent use.
- F. Proceed only after unsatisfactory conditions have been corrected. Commencement of work in this section will be an indication of the acceptance of substrate conditions and the Contractor will be held responsible for the satisfactory execution and results of the finished work.

3.02 INSTALLATION

- A. Install basket trays where indicated, with associated extensions to local telecommunication rooms.
- B. Install products in accordance with manufacturer's written instructions.
- C. Install wire basket cable trays as a complete system, including fasteners, hold-down clips, support systems, barrier strips, adjustable horizontal and vertical splice plates, elbows, reducers, tees, crosses, cable dropouts, adapters, and bonding.
 - 1. Basket tray shall be supported by trapeze assemblies with threaded rods extending to building structural members or structural concrete slabs above.
 - a. Wire basket cable trays shall be supported from building structural members, such as joists, beams, and girders, by use of manufacturer's standard beam clamps, or from post-installed anchors set into structural concrete slabs.
 - b. Wire basket cable trays shall not be supported from metal roof deck.
 - 2. Fittings shall be field-fabricated according to manufacturer's written instructions from straight tray sections.
 - a. Make changes in direction by cutting and bending straight sections.
 - b. Provide only radial bends around corners. 90-degree turns are not permitted.
 - c. Particular care shall be taken when cutting wire basket cable trays. Offset cutting, with side-action angle bolt cutters, with offset head, or manufacturer's power angle cutting tool, shall be utilized. Center cutting is not acceptable.
 - 1) Cuts shall be made angling away from the new end of the basket tray.
 - 2) Cut each wire with one clean cut to minimize need for sanding or grinding of sharp edges. Rest lower jaw of bolt cutter against cradle wire and cut at an angle.
 - 3) Cut wires on bottom side of tray, according to manufacturer's instructions, before cutting wires on sides of tray. Cut from underside of basket tray.
 - 4) After cutting wires on bottom side of tray, cut wires on sides of tray according to manufacturer's instructions.
 - 5) Cut ends shall not extend beyond edge of cross wire. Wires that extend beyond cross wires after cutting shall be recut as required to comply. Use of rubber caps or other devices on exposed cut ends is not acceptable.
- D. Unless otherwise indicated, arrange cable tray to be parallel or perpendicular to building lines.
- E. Arrange cable tray to provide required clearances and maintain cable access.
 - 1. Minimum Clearance Above and Adjacent to Cable Tray: 12 inches.
 - 2. Cable Tray for Telecommunications Cables: Maintain recommended separation from sources of EMI greater than 5 kVA in accordance with NECA/BICSI 568.
- F. Install cable tray plumb and level, with sections aligned and with horizontal runs at the proper elevation.

- G. Remove burrs and sharp edges from basket trays.
- H. Locate basket tray above piping except as required for tray accessibility and where indicated.
- I. Cable Provisions:
 - 1. Use suitable fixed barrier strips to maintain separation of cables as indicated and as required by City of Chicago Building Code.
 - 2. Use suitable drop-out fittings or bushings where cables exit cable tray as required to maintain minimum cable bending radius.
- J. Cable Tray Support:
 - 1. Use manufacturer's recommended hangers and supports, located in accordance with NEMA VE 2 and manufacturer's requirements, but not exceeding specified span unless otherwise approved by Engineer. Provide required support and attachment components in accordance with Section 26 05 29 - Hangers and Supports for Electrical Systems, where not furnished by cable tray manufacturer.
 - 2. Locate and install supports not more than five (5) feet apart. Do not install wire basket cable tray splice at support location. Do not install more than one splice between supports.
 - 3. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 - 4. Support at Connections to Equipment: Where basket trays connect to equipment, provide flanged fittings fastened to the tray and to the equipment. Support the tray separately. Do not carry the weight of the tray on the equipment enclosure.
- K. Grounding and Bonding Requirements, in Addition to Requirements of Section 26 05 26 - Grounding and Bonding for Electrical Systems:
 - 1. Electrically ground wire basket cable trays and ensure continuous electrical conductivity of wire basket cable tray system. Use tray as an equipment ground conductor for itself only, not for connected equipment.
 - 2. Comply with grounding and bonding requirements of NEMA VE 2.
 - 3. Metal Cable Tray Systems: Use suitable bonding jumpers or classified connectors to provide electrical continuity.
 - 4. Metal cable tray system may be used as sole equipment grounding conductor only where all conditional requirements of City of Chicago Building Code.
 - a. Installation must be in a qualifying facility with suitable maintenance and supervision as determined by authorities having jurisdiction.
 - b. Cable tray system must be steel or aluminum (as specified) and classified as an equipment grounding conductor (note that stainless steel cable tray is not permitted for use as an equipment grounding conductor).
 - c. Cable tray must meet minimum cross-sectional area requirements.
- L. Penetrations: Install firestopping to preserve fire resistance rating and smoke barriers of building elements, using materials and methods specified in Section 07 84 00 - Firestopping.
 - 1. Sleeves for Future Basket Tray: Install capped metal sleeves for future cables through firestop-sealed basket tray penetrations of fire and smoke barriers.

3.03 FIRESTOPPING

- A. General: Refer to Section 07 84 00 - Firestopping, and the following regarding locations where cabling extends through fire-rated partitions.
 - 1. Wire basket cable trays shall not extend through fire-rated partitions.
 - 2. Where cabling is indicated to extend through fire-rated partitions, the wire basket cable tray shall stop eight (8) inches from the wall, the end of the tray supported by manufacturer's standard wall bracket, and the cabling shall extend through the partition

as part of an assembly that has been tested by UL or another qualified testing and inspecting agency acceptable to authorities having jurisdiction.

3.04 CABLE INSTALLATION

- A. Install cables only when wire basket cable tray installation has been completed and inspected.
- B. Fasten cables on horizontal runs with Velcro straps according to NEMA VE 2, at not less than eight (8) feet on center to separate systems within tray. Tighten only enough to secure the cable, without indenting the cable jacket.
- C. On vertical runs, fasten cables to tray every 18 inches. Install intermediate supports when cable weight exceeds the load-carrying capacity of the tray rungs.
- D. In existing construction, inactive or dead wire basket cable trays cannot be added to new basket tray. Remove inactive or dead cables from wire basket cable trays.

3.05 FIELD QUALITY CONTROL

- A. After installing cables in the wire basket cable trays, survey for compliance with requirements. Perform the following field quality-control inspections:
 - 1. Inspect cable tray system for damage and defects. Correct sharp corners, protuberances in wire basket cable tray, and vibrations, which may cause or have caused damage.
 - 2. Verify that the number and size of cables in wire basket cable tray do not exceed that permitted by the authorities having jurisdiction.
 - 3. Verify that there is no intrusion of such items as pipe, hangers, or other equipment in the wire basket cable trays.
 - 4. Remove deposits of dust, trash of any description, and any blockage of tray ventilation.
 - 5. Visually inspect each wire basket cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and re-torque in suspect areas.
 - 6. Check for missing, incorrect, or damaged bolts, bolt heads, or nuts. When found, replace with specified hardware.
 - 7. Perform visual and mechanical checks for adequacy of basket tray grounding; verify that all takeoff raceways are bonded to wire basket cable tray.
- B. Correct deficiencies and replace damaged or defective cable tray system components.
- C. Report results in writing.

3.06 ADJUSTING

- A. Adjust tightness of mechanical connections to manufacturer's recommended torque settings.

3.07 CLEANING

- A. Remove dirt and debris from cable tray.
- B. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.08 PROTECTION

- A. Protect cable tray system from subsequent construction operations.

1. Repair damage to galvanized finish with zinc-rich galvanizing repair paint recommended in writing by wire basket cable tray manufacturer.
2. Install temporary protection for wire basket cable trays and cables during remainder of construction activities to ensure tray and cable installations are free of damage at Preliminary Acceptance / Substantial Completion.

END OF SECTION 27 05 38