

**SECTION 27 05 36**

**CABLE TRAYS FOR TELECOMMUNICATION SYSTEMS**

**Part 1 – GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing of all necessary labor, supervision, materials, equipment, installation, tests, and services to completely execute a complete wire basket cable tray system as described in this specification and as shown on the drawings.
- B. Wire basket cable tray systems are defined to include, but are not limited to straight sections of continuous wire mesh, field formed horizontal and vertical bends, tees, dropouts, supports and accessories.
- C. This section includes steel, cable trays and accessories.

**1.2 RELATED WORK**

- A. Section 27 05 11, Requirement for Communications Installations.
- B. Section 27 05 26, Grounding and Bonding for Communications Systems.
- C. Section 27 05 33, Raceways and Boxes for Communications Systems.

**1.3 DRAWINGS**

- A. The drawings, which constitute a part of these specifications, indicate the general route of the wire basket cable tray systems. Data presented on these drawings is as accurate as preliminary surveys and planning can determine until final equipment selection is made. Accuracy is not guaranteed and field verification of all dimensions, routing, etc., is required.
- B. Specifications and drawings are for assistance and guidance, but exact routing, locations, distances and levels will be governed by actual field conditions. Contractor is directed to make field surveys as part of his work prior to submitting system layout drawings.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.
- B. Shop Drawings:
  - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
  - 2. Include the location of system equipment grounding connections.

3. Detail fabrication, including anchorages and attachments to structure and to supported cable trays.
- C. Certifications: Two weeks prior to final inspection, submit four copies of the following to the COR:
  1. Certification that the materials and installation is in accordance with the drawings and specifications.
  2. Certification, by the Contractor, that the complete installation has been properly installed and tested.

#### **1.5 APPLICABLE PUBLICATIONS**

Publications listed below (including amendments, addenda, revisions, supplements, and errata) for a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

A. American Society for Testing and Materials (ASTM) International:

ASTM A1011 / A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

ASTM A123 / A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

ASTM A510 - Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.

ASTM A513 - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.

ASTM A580 – Standard Specification for Stainless Steel Wire.

ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.

ASTM A641 / A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

ASTM A653 / A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

81-2012.....IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

- C. National Fire Protection Association (NFPA):  
70-2014.....National Electrical Code (NEC)
- D. National Electrical Manufacturers Association:  
NEMA VE 1 – Metal Cable Tray Systems.  
NEMA VE 2 – Cable Tray Installation Guidelines.
- E. Telecommunications Industry Association, (TIA)  
J-STD-607-B-2011 .....Generic Telecommunications Bonding and Grounding (Earthing)  
for Customer Premises
- F. Underwriters Laboratories, Inc. (UL):  
44-2010 .....Thermoset-Insulated Wires and Cables  
83-2008 .....Thermoplastic-Insulated Wires and Cables  
467-2007 .....Grounding and Bonding Equipment  
486A-486B-2013 .....Wire Connectors

## **PART 2 – PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. Delegated Design: Engage a qualified professional engineer to design cable tray supports and bracing.

### **2.2 GENERAL REQUIREMENTS FOR CABLE TRAYS**

- A. Cable Trays and Accessories: Identified as defined in NFPA 70 and marked for intended location, application, and grounding.
  - 1. Source Limitations: Obtain cable trays and components from single manufacturer.
- B. Sizes and Configurations: As indicated on the Drawings.
- C. Structural Performance: See article on individual cable tray types for specific values for the following parameters:
  - 1. Uniform Load Distribution: Capable of supporting a uniformly distributed load on the indicated support span when supported as a simple span and tested according to NEMA VE1.
  - 2. Concentrated Load: A load applied at midpoint of span and centerline of tray.
  - 3. Load and Safety Factors: Applicable to both side rails and rung capacities.

### **2.3 WIRE BASKET CABLE TRAY SECTIONS AND COMPONENTS**

- A. Provide wire basket cable tray of types and sizes indicated with connector assemblies, clamp assemblies, connector plates, splice plates and splice bars. Construct units with rounded edges and smooth surfaces; in compliance with applicable standards; and with the additional construction highlighted in this section.
- B. All straight section longitudinal wires shall be constructed with a continuous top wire safety edge. Safety edge must be kinked and T-welded on all tray sizes.
- C. Wire basket cable tray shall be made of high strength steel wires and formed into a standard 2 inch by 4 inch wire mesh pattern with intersecting wires welded together. All mesh sections must have at least one bottom longitudinal wire along entire length of straight section.
- D. Wire basket cable tray sizes shall conform to the following nominal criteria:
  - 1. Straight sections shall be furnished in standard 118.3 inch lengths.
  - 2. Wire diameter shall be 0.196" (5mm) minimum on all mesh sections.
  - 3. Wire basket cable tray shall have a 6 inch usable loading depth by 24 inches wide.
- E. In order for a system to be approved as an equipment ground conductor (EGC), all splicing assemblies shall be UL Classified or CSA approved as an EGC. When using powder coated wire mesh cable tray as an EGC, the paint must be completely removed at all contact points of splice/ground bolt attachments. The system is still required to abide by the grounding and bonding requirements in specification 27 05 26 Grounding and Bonding for Communications Systems.
- F. Material and Finishes: Material and finish specifications for Pre-Galvanize Steel Wire are as follows.
  - 1. Electro-Plated Zinc Galvanizing: Straight sections shall be made from steel meeting the minimum mechanical properties of ASTM A510, Grade 1008 and shall be electro-plated zinc in accordance with ASTM B633, Type III, SC-1.
  - 2. Pre-Galvanized Zinc: Straight sections shall be made from pre-galvanized steel meeting the minimum mechanical properties of ASTM A641.
  - 3. Hot Dipped Galvanizing: Straight sections shall be made from steel meeting the minimum mechanical properties of ASTM A510, Grade 1008 and shall be hot dipped galvanized after fabrication in accordance with ASTM A123.

- G. All fittings shall be field formed from straight sections in accordance with manufacturer's instructions.
- H. Wire basket cable tray supports shall be center support hangers, trapeze hangers or wall brackets as approved by COR.
- I. Trapeze hangers or center support hangers shall be supported by 3/8" inch diameter rods.
- J. Special accessories shall be furnished as required to protect, support and install a wire basket cable tray system.
- K. Use radius down accessories for all cables leaving the cable tray system to either the IT closet or from the cable tray system down and through the interstitial space for distribution to jacks.

## **2.4 QUALITY ASSURANCE**

- A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the COR.
- B. Supply all equipment and accessories new and free from defects.
- C. Supply all equipment and accessories in compliance with the applicable standards listed in Part 1.5 of this section and with all applicable national, state and local codes.
- D. All items of a given type shall be the products of the same manufacturer.
- E. Zinc plated wire basket cable tray shall be classified by Underwriters Laboratories (UL).
- F. Wire basket cable tray shall be of uniform quality and appearance.
- G. Comply with the National Electrical Code (NEC), as applicable, relating to construction and installation of cable tray and cable channel systems (Article 392, NEC).
- H. Comply with NFPA 70B, "Recommended Practice for Electrical Equipment Maintenance" pertaining to installation of cable tray systems.

## **PART 3 – EXECUTION**

### **3.1 EXISTING WORK**

- A. Extend existing wire basket cable tray installations using materials and methods [compatible with existing installation(s), or] as specified.
- B. Clean and repair existing wire basket cable tray to remain or to be reinstalled.

### **3.2 CABLE TRAY INSTALLATION**

- A. Install cable trays according to NEMA VE 2.

- B. Install 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, covers, and bonding.
- C. Install cable trays so that the tray is accessible for cable installation and all splices are accessible for inspection and adjustment.
- D. Remove burrs and sharp edges from cable trays.
- E. Where supported by All Threaded Rod (ATR), use a minimum of 3/8" rod.
- F. Fasten cable tray supports to building structure.
- G. Design fasteners and supports to carry cable tray, the cables, and a concentrated load of 200 lb.
- H. Place supports so that spans do not exceed maximum spans on schedules and provide clearances shown on Drawings. Install intermediate supports when cable weight exceeds the load-carrying capacity of the tray rungs.
- I. Construct supports from channel members, threaded rods, and other appurtenances furnished by cable tray manufacturer. Arrange supports in trapeze or wall-bracket form as required by application.
- J. Support bus assembly to prevent twisting from eccentric loading.
- K. Install center-hung supports for single-rail trays designed for 60 versus 40 percent eccentric loading condition, with a safety factor of 3.
- L. Locate and install supports according to NEMA VE 2. Do not install more than one cable tray splice between supports.
- M. Make connections to equipment with flanged fittings fastened to cable tray and to equipment. Support cable tray independent of fittings. Do not carry weight of cable tray on equipment enclosure.
- N. Install expansion connectors where cable tray crosses building expansion joint and in cable tray runs that exceed dimensions recommended in NEMA VE 2. Space connectors and set gaps according to applicable standard.
- O. Make changes in direction and elevation using standard fittings.
- P. Make cable tray connections using manufacturer's recommended fittings.
- Q. Seal penetrations through fire and smoke barriers. Comply with requirements for "Penetration Firestopping" in Section 07 84 00 "Firestopping".

- R. Install capped metal sleeves for future cables through firestop-sealed cable tray penetrations of fire and smoke barriers.
- S. Install cable trays with enough workspace to permit access for installing cables.
- T. Coordinate wire basket cable tray with other work as necessary to properly interface installation of wire basket cable tray with the other work.
- U. Install barriers to separate cables of different systems, such as communications, patient monitoring, and data processing as directed by drawings.

### **3.3 CABLE TRAY GROUNDING**

- A. Ground cable trays according to NFPA 70 unless additional grounding is specified. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. When using epoxy- or powder-coat painted cable trays as a grounding conductor, completely remove coating at all splice contact points or ground connector attachment. After completing splice-to-grounding-bolt attachment, repair the coated surfaces with coating materials recommended by cable tray manufacturer.

### **3.4 CABLE INSTALLATION**

- A. Install cables only when cable tray installation has been completed and inspected.
- B. Fasten cables on vertical runs to cable trays every 18 inches using Velcro straps.
- C. Fasten and support cables that pass from one cable tray to another or drop from cable trays to equipment enclosures. Fasten cables to the cable tray at the point of exit and support cables independent of the enclosure. The cable length between cable trays or between cable tray and enclosure shall be no more than 72 inches.
- D. In existing construction, remove inactive or dead cables from cable tray.

### **3.5 CONNECTIONS**

- A. Remove paint from all connection points before making connections. Repair paint after the connections are completed.
- B. Connect raceways to cable trays according to requirements in NEMA VE 2 and NEMA FG 1.

### **3.6 FIELD QUALITY CONTROL**

- A. Perform the following tests and inspections:
  - 1. After installing cable trays and after cabling is 'on-line', survey for compliance with requirements.
  - 2. Visually inspect cable insulation for damage. Correct sharp corners, protuberances in

cable tray, vibrations, and thermal expansion and contraction conditions, which may cause or have caused damage.

3. Verify that there are no intruding items such as pipes, hangers, or other equipment in the cable tray.
4. Remove dust deposits, industrial process materials, trash of any description, and any blockage of tray ventilation.
5. Visually inspect each 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 cable tray grounding; verify that all takeoff raceways are bonded to cable tray. Test entire cable tray system for continuity. Maximum allowable resistance is 1 ohm.

B. Prepare test and inspection reports.

### **3.7 PROTECTION**

A. Protect installed cable trays.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by cable tray manufacturer.
2. Repair damage to paint finishes with matching touchup coating recommended by cable tray manufacturer.

END OF SECTION 26 05 36