

**SECTION 270536 - CABLE TRAYS FOR COMMUNICATIONS SYSTEMS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Ladder cable tray.
- 2. Wire-mesh cable tray.
- 3. Single-rail cable tray.
- 4. Trough cable tray.
- 5. Fiberglass cable tray.
- 6. Cable tray accessories.
- 7. Warning signs.

B. Related Requirements:

- 1. Section 260536 "Cable Trays for Electrical Systems" for cable trays and accessories serving electrical systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cable tray.

- 1. Include data indicating dimensions and finishes for each type of cable tray indicated.

B. Shop Drawings: For each type of cable tray.

- 1. Show fabrication and installation details of cable trays, including plans, elevations, and sections of components and attachments to other construction elements. Designate components and accessories, including clamps, brackets, hanger rods, splice-plate connectors, expansion-joint assemblies, straight lengths, and fittings.
- 2. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
  - a. Vertical and horizontal offsets and transitions.
  - b. Clearances for access above and to sides of cable trays.
  - c. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
  - d. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Floor plans and sections, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Scaled cable tray layout and relationships between components and adjacent structural, electrical, and mechanical elements.
  - 2. Vertical and horizontal offsets and transitions.
  - 3. Clearances for access above and to side of cable trays.
  - 4. Vertical elevation of cable trays above the floor or below bottom of ceiling structure.
- B. Seismic Qualification Certificates: For cable trays, accessories, and components, from manufacturer.
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.

### **PART 2 - PRODUCTS**

#### **2.1 PERFORMANCE REQUIREMENTS**

- A. Seismic Performance: Cable trays and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. The term "withstand" means "the cable trays will remain in place without separation of any parts when subjected to the seismic forces specified."
  - 2. Component Importance Factor: 1.5.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes in cable tray installed outdoors.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

#### **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: See the Cable Tray Schedule on Drawings for specific requirements for types, materials, sizes, and configurations.

- C. Structural Performance: See articles for 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 VE 1.
  - 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 LADDER CABLE TRAY

- A. Acceptable Manufacturer: Chatsworth Products Inc.
- B. Description:
  - 1. Configuration: Two longitudinal side rails with transverse rungs swaged or welded to side rails, complying with NEMA VE 1.
  - 2. Width: indicated on Drawings.
  - 3. Minimum Usable Load Depth: 6 inches (150 mm).
  - 4. Straight Section Lengths: 10 feet (3000 mm), except where shorter lengths are required to facilitate tray assembly.
  - 5. Rung Spacing: 9 inches (225 mm) o.c.
  - 6. Radius-Fitting Rung Spacing: 9 inches (225 mm) at center of tray's width.
  - 7. Minimum Cable-Bearing Surface for Rungs: 7/8-inch (22-mm) width with radius edges.
  - 8. No portion of the rungs shall protrude below the bottom plane of side rails.
  - 9. Structural Performance of Each Rung: Capable of supporting a maximum cable load, with a safety factor of 1.5, plus a 200-lb (90-kg) concentrated load, when tested according to NEMA VE 1.
  - 10. Fitting Minimum Radius: 24 inches (600 mm).
  - 11. Class Designation: Comply with NEMA VE 1, Class 8A.
  - 12. Splicing Assemblies: Bolted type using serrated flange locknuts.
  - 13. Splice-Plate Capacity: Splices located within support span shall not diminish rated loading capacity of cable tray.
- C. Materials and Finishes:
  - 1. Steel:
    - a. Straight Section and Fitting Side Rails and Rungs: Steel complies with the minimum mechanical properties of ASTM A 1011/A 1011M, SS, Grade 33.
    - b. Steel Tray Splice Plates: ASTM A 1011/A 1011M, HSLAS, Grade 50, Class 1.
    - c. Fasteners: Steel complies with the minimum mechanical properties of ASTM A 510/A 510M, Grade 1008.
    - d. Finish: Epoxy-resin or Powder-coat enamel paint.
      - 1) Powder-Coat Enamel: Cable tray manufacturer's recommended primer and corrosion-inhibiting treatment, with factory-applied powder-coat paint.
      - 2) Epoxy-Resin Prime Coat: Cold-curing epoxy primer, MPI# 101.
      - 3) Epoxy-Resin Topcoat: Epoxy, cold-cured gloss, MPI# 77.
      - 4) Hardware: Chromium-zinc plated, ASTM F 1136.

**2.4 WARNING SIGNS**

- A. Lettering: 1-1/2-inch- (40-mm-) high, black letters on yellow background with legend "Warning! Not To Be Used as Walkway, Ladder, or Support for Ladders or Personnel."
- B. Comply with requirements for fasteners in Section 260553 "Identification for Electrical Systems."

**2.5 SOURCE QUALITY CONTROL**

- A. Testing: Test and inspect cable trays according to NEMA VE 1.

**PART 3 - EXECUTION**

**3.1 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. Fasten cable tray supports to building structure.
- F. 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.
- G. 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.
- H. Support bus assembly to prevent twisting from eccentric loading.
- I. Install center-hung supports for single-rail trays designed for 60 versus 40 percent eccentric loading condition, with a safety factor of 3.
- J. Locate and install supports according to NEMA VE 2. Do not install more than one cable tray splice between supports.

**3.2 CABLE TRAY GROUNDING**

- A. Ground cable trays according to NFPA 70 unless additional grounding is specified. Comply with requirements in Section 270526 "Grounding and Bonding for Communications Systems."

- B. Cable trays shall be bonded together with splice plates listed for grounding purposes or with listed bonding jumpers.
- C. Cable trays with single-conductor power conductors shall be bonded together with a grounding conductor run in the tray along with the power conductors and bonded to the tray at 72-inch (1800-mm) intervals. The grounding conductor shall be sized according to NFPA 70, Article 250.122, "Size of Equipment Grounding Conductors," and Article 392, "Cable Trays."
- D. 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.
- E. Bond cable trays to power source for cables contained within with bonding conductors sized according to NFPA 70, Article 250.122, "Size of Equipment Grounding Conductors."

### **3.3 CABLE INSTALLATION**

- A. Install cables only when each cable tray run has been completed and inspected.
- B. Fasten cables on horizontal runs with cable clamps or cable ties according to NEMA VE 2. Tighten clamps only enough to secure the cable, without indenting the cable jacket. Install cable ties with a tool that includes an automatic pressure-limiting device.
- C. Fasten cables on vertical runs to cable trays every 18 inches (450 mm).
- D. 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 (1800 mm).
- E. Tie MI cables down every 36 inches (900 mm) where required to provide a 2-hour fire rating and every 72 inches (1800 mm) elsewhere.
- F. In existing construction, remove inactive or dead cables from cable trays.

### **3.4 CONNECTIONS**

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

### **3.5 FIELD QUALITY CONTROL**

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. After installing cable trays and after electrical circuitry has been energized, survey for compliance with requirements.

2. Visually inspect cable insulation for damage. Correct sharp corners, protuberances in cable trays, vibrations, and thermal expansion and contraction conditions, which may cause or have caused damage.
3. Verify that the number, size, and voltage of cables in cable trays do not exceed that permitted by NFPA 70. Verify that communications or data-processing circuits are separated from power circuits by barriers or are installed in separate cable trays.
4. Verify that there are no intruding items such as pipes, hangers, or other equipment in the cable tray.
5. Remove dust deposits, industrial process materials, trash of any description, and any blockage of tray ventilation.
6. Visually inspect each cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and retorqued in suspect areas.
7. Check for improperly sized or installed bonding jumpers.
8. Check for missing, incorrect, or damaged bolts, bolt heads, or nuts. When found, replace with specified hardware.
9. Perform visual and mechanical checks for adequacy of cable tray grounding; verify that all takeoff raceways are bonded to cable trays. Test entire cable tray system for continuity. Maximum allowable resistance is 1 ohm.

B. Prepare test and inspection reports.

### 3.6 PROTECTION

A. Protect installed cable trays and cables.

1. Install temporary protection for cables in open trays to safeguard exposed cables against falling objects or debris during construction. Temporary protection for cables and cable tray can be constructed of wood or metal materials and shall remain in place until the risk of damage is over.
2. Repair damage to galvanized finishes with zinc-rich paint recommended by cable tray manufacturer.
3. Repair damage to paint finishes with matching touchup coating recommended by cable tray manufacturer.

END OF SECTION 270536