

SECTION 16139 CABLE TRAYS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes:
 - 1. Cable trays and accessories.
- B. Related Sections include the following:
 - 1. Division 7, Section 07841, "Through-Penetration Firestop System" for firestopping materials and installation requirements.
 - 2. Division 16, Section 16050, "Basic Materials and Methods" for cable tray supports not specified in this Section.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 123/A 123M-97a: Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. ASTM A 653/A 653M-97: Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM B 633-85 (Reapproved 1994): Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
 - 4. ASTM B 766-86 (Reapproved 1993): Specification for Electrodeposited Coatings of Cadmium.
- B. National Electrical Manufacturers Association (NEMA)
 - 1. NEMA VE 1-96: Metal Cable Tray Systems.
- C. National Fire Protection Association (NFPA)
 - 1. NFPA 70-99: National Electrical Code.
- D. Underwriters Laboratories, Inc. (UL)
 - 1. UL 486A-98: Wire Connectors and Soldering Lugs for Use with Copper Conductors.

1.4 SUBMITTALS

- A. Product Data: Include data indicating dimensions and finishes for each type of cable tray.
- B. Shop Drawings: Detail fabrication and installation of cable tray, 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.
- C. Design Calculations: Verify loading capacities for supports.

- D. Coordination Drawings: Include floor plans and sections drawn to scale. Include scaled cable tray layout and relationships between components and adjacent structural and mechanical elements.
- E. Factory-certified test reports of specified products, complying with NEMA VE 1.
- F. Field Test Reports: Indicate and interpret test results for compliance with performance requirements specified in "Field Quality Control" Article.
- G. Maintenance Data: For cable trays to include in the maintenance manuals specified in General and Supplementary Conditions.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain cable tray components through one source from a single manufacturer.
- B. Listing and Labeling: Provide cable trays and accessories specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.
- C. Comply with NEMA VE 1, "Metal Cable Tray Systems," for materials, sizes, and configurations.
- D. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Construction Manager (CM) or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated.
 - 1. Notify Construction Manager not less than 2 days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without CM's written permission.

1.7 COORDINATION

- A. Coordinate layout and installation of cable tray with other installations.
 - 1. Revise locations and elevations from those indicated as required to suit field conditions and as approved by Construction Manager.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. B-Line Systems, Inc.
 - 2. Chalfant Cable Trays.
 - 3. GS Metals Corp.
 - 4. Husky: MP Husky Corp.
 - 5. Mono-Systems, Inc.
 - 6. P-W Industries, Inc.

2.2 MATERIALS AND FINISHES

- A. Cable Trays, Fittings, and Accessories: Steel, mill galvanized before fabrication, complying with **ASTM A 653, G90 (ASTM A 653M, Z275)** coating.
- B. Cable Trays, Fittings, and Accessories: Steel, hot-dip galvanized after fabrication, complying with ASTM A 123, Class B2.
- C. Cable Trays, Fittings, and Accessories: Steel, with PVC coating applied in a fluidized bed or by electrostatic spray.
- D. Cable Trays, Fittings, and Accessories: Steel, with epoxy-resin paint finish over paint manufacturer's recommended primer and corrosion-inhibiting treatment.
- E. Cable Trays, Fittings, and Accessories: Aluminum, complying with Aluminum Association's alloy 6063-T6 for rails, rungs, and cable trays, and alloy 5052-H32 or 6061-T6 for fabricated parts.
- F. Cable Trays, Fittings, and Accessories: Stainless steel, Type 304.
- G. Protect steel hardware against corrosion by galvanizing according to ASTM B 633 or cadmium plating according to ASTM B 766.
- H. Fabricate cable tray products with rounded edges and smooth surfaces.
- I. Sizes and Configurations: Refer to Cable Tray Schedule on Drawings for specific requirements for types, materials, sizes, and configurations.
- J. Sizes and Configurations: Refer to Cable Tray Schedule at the end of the Section for specific requirements for types, materials, sizes, and configurations.

2.3 CABLE TRAY ACCESSORIES

- A. Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray.
- B. Covers: Solid type, of same materials and finishes as cable tray.
- C. Covers: Louvered type, of same materials and finishes as cable tray.
- D. Covers: Ventilated-hat type, of same materials and finishes as cable tray.
- E. Barrier Strips: Same materials and finishes as cable tray.
- F. Cable tray supports and connectors, including bonding jumpers, as recommended by cable tray manufacturer.

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. Materials and fastening are specified in Division 16, Section 16196, "Electrical Identification."

- C. Materials and fastening are specified in Division 16, Section 16050, "Basic Materials and Methods."

2.5 SOURCE QUALITY CONTROL

- A. Perform design and production tests according to NEMA VE 1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of cable trays. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install cable tray level and plumb according to manufacturer's written instructions, coordination drawings, original design, and referenced standards.
- B. Remove burrs and sharp edges from cable trays.
- C. Fasten cable tray supports securely to building structure as specified in Division 16, Section 16050, "Basic Materials and Methods," unless otherwise indicated.
 - 1. Locate and install supports according to NEMA VE 1.
 - 2. Design supports, including fastenings to the structure, to carry the greater of the calculated load multiplied by a safety factor of 4 or the calculated load plus 200 lb (90 kg).
 - 3. Coordinate support hangers with other trades to assure common hanger systems meet these criteria for all loads suspended by these supports.
- D. Make connections to equipment with flanged fittings fastened to cable tray and to equipment. Support cable tray independently of fittings. Do not carry weight of cable tray on equipment enclosure.
- E. Install expansion connectors where cable tray crosses a building expansion joint and in cable tray runs that exceed 90 feet (27 m). Space connectors and set gaps according to NEMA VE 1.
- F. Make changes in direction and elevation using standard fittings, except where specifically shown otherwise.
- G. Make cable tray connections using standard fittings.
- H. Locate cable tray above piping, unless accessibility to cable tray is required or unless otherwise indicated.
- I. Seal penetrations through fire and smoke barriers according to Division 7, Section 07841, "Through-Penetration Firestop System."
- J. Sleeves for Future Cables: Install metallic capped sleeves for future cables through firestopping-sealed cable tray penetrations of fire and smoke barriers.
- K. Workspace: Install cable trays with sufficient space to permit access for installing cables.

- L. Install barriers to separate cables of different systems, such as power, communications, and data processing; or of different insulation levels, such as 600, 5,000, and 15,000 V.
- M. Install covers after installation of cable is completed.

3.3 CONNECTIONS

- A. Ground cable trays according to manufacturer's instructions.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
 - 2. Provide ground conductor on cable tray where shown with either bare conductor or insulated conductor as shown. Conductor shall comply with Section 16120, "Building Wire & Cable 600V and Below."

3.4 WARNING SIGNS

- A. After installation of cable trays is completed, install warning signs in visible locations on or near cable trays.

3.5 FIELD QUALITY CONTROL

- A. Grounding: Test cable trays to ensure electrical continuity of bonding and grounding connections.
- B. Anchorage: Test pullout resistance for toggle bolts and powder-driven threaded studs for each type and size of anchorage material.
 - 1. Furnish equipment, including jacks, jigs, fixtures, and calibrated indicating scales, required for reliable testing.
 - 2. Obtain CM's approval before transmitting loads to the structure. Test to 90 percent of rated proof load for fastener.
- C. Replace malfunctioning units.

3.6 CLEANING

- A. On completion of cable tray installation, including fittings, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes, including chips, scratches, and abrasions.

3.7 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure cable tray is without damage or deterioration at the time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by cable tray manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by cable tray manufacturer.

3.8 CABLE TRAY SCHEDULE

- A. Run Designation: All areas for power.
 - 1. Type: Ladder.
 - 2. Material and Finish: Hot dipped galvanized steel after fabrication or aluminum.

3. Width: As shown.
 4. Cross-Rung Spacing: 9 inches.
 5. Minimum Fitting Radius: 12 inches.
 6. Inside Depth: 3-1/2 inches.
 7. Cover Type: Ventilated, only where covers are specifically called for or shown.
 8. NEMA Load/Span Class: 12B.
- B. Run Designation: All areas for signal/controls/communications/alarms/PPS/EPS or diagnostics.
1. Type: Solid Bottom.
 2. Material and Finish: Hot dipped galvanized steel after fabrication or aluminum.
 3. Width: As shown.
 4. Cross Rung Spacing: n/a.
 5. Minimum Fitting Radius: 12 inches.
 6. Inside Depth: 3-1/2 inches.
 7. Cover Type: Solid, only where covers are specifically called for or shown.
 8. NEMA Load/Span Class: 12B.

END OF SECTION 16139