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SECTION 27 05 36

CABLE TRAYS FOR COMMUNICATION SYSTEMS (Ladder Tray)

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This Section 27 05 36 includes metal cable trays of types and sizes included in NEMA VE 1.

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Throughout this document you will find designated 'specifier notes' or links to specific electronic resources in green to better serve your needs. If you have any questions or comments, please contact your local Cope Cable Tray Brand sales representative.

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PART 1 GENERAL

1.1 SUMMARY

A. The work covered under this Section 27 05 36 consists of furnishing of necessary labor, supervision, materials, equipment, tests and services to install complete cable tray systems as shown on the drawings.

B. Cable tray systems are defined to include, but are not limited to straight sections of [ladder type] [trough type] [solid bottom type] [channel type] cable trays, bends, tees, elbows, drop-outs, supports, and accessories.

C. Related Sections:

1. Section 27 05 26 - Grounding and Bonding for Communication Systems.
2. Section 27 05 29 - Hangers and Supports for Communication Systems.
3. Section 27 05 28 – Pathways for Communication Systems

1.2 REFERENCES

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List reference standards included within text of this section. Edit the following depending on Project conditions.

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A. ASTM International:
    1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
    3. ASTM A1011 – Specification for Steel, Sheet and Strip, Hot- Rolled, Carbon, Structural, High-Strength Low-Alloy and High Strength Low Alloy with Improved Formability *(Formally ASTM A570 & A607).*
    4. ASTM A1008 – Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, high-Strength Low-Alloy and high-Strength Low-Alloy with Improved Formability *(Formally ASTM A611).*
    5. ASTM B633 – Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
B. National Electrical Manufacturers Association:
    1. NEMA VE 1- - Metal Cable Tray Systems.
    2. NEMA VE 2- - Cable Tray Installation Guidelines.
C. NFPA 70: National Electrical Code

1.3 DRAWINGS

A. The drawings, which constitute a part of these specifications, indicate the general route of the cable tray systems. Data presented on these drawings is as only 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, structural loading, regional and national compliances are 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 QUALITY ASSURANCE

A. All cable and equipment shall be installed in a neat and professional 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 owner or owner's representative. Atkore does not warrant and shall not be liable for any claims or damages related to the installation of the Products
B. Distributors to supply all equipment and accessories new and free from defects.
C. Distributors to supply all equipment and accessories in compliance with the applicable standards listed in Part 1.2 of this section and with all applicable national, state and local codes.
D. Distributors to supply all items of a given type shall be the products of the same manufacturer.

E. Manufacturers: Firms regularly engaged in manufacture of cable trays and fittings of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
F. NEMA Compliance: Manufacturer to comply with NEMA Standards Publication Number VE1, "Cable Tray Systems".
G. NEC Compliance: Contractor to comply with NEC, as applicable to construction and installation of cable tray and cable channel systems (Article 392 NEC).
H. UL Compliance: Manufacturer to provide products that are UL-classified and labeled.
I. NFPA Compliance: Contractor to comply with NFPA 70B, "Recommended Practice for Electrical Equipment Maintenance" pertaining to installation of cable tray systems.

1.5 DELIVERY, STORAGE AND HANDLING

A. Onsite delivery of cable tray systems and components carefully to avoid breakage, denting and scoring finishes. Do not install damaged equipment.
B. Onsite storage of cable trays and accessories to be in in original cartons and in clean dry space; protect from weather and construction traffic. Wet materials should be unpacked and dried before storage.

1.6 SUBMITTALS

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Click here to visit Cope Cable Tray for submittals. These may be supplied by the distributor from the Cope Cable Tray Brand website at time of quoting

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A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
B. Shop Drawings: Indicate tray type, dimensions, support points, and finishes.
C. Product Data: Submit fittings and accessories.
D. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.7 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
B. Project Record Documents: Contractor to record actual routing of cable tray and locations of supports.

1.8 QUALIFICATIONS

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Include the following paragraph if a list of manufacturer is not included or when substitutions are allowed to define applicable requirements. [] denotes a variable or choice
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A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum [_____] years of documented experience, and with service facilities within [_____] miles of Project.

1.9 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
B. Convene a minimum of [_____] week(s) prior to commencing work of this section.

PART 2 PRODUCTS

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NEMA VE 1 Class designation, indicated in the following specifications for metal cable tray, is support span in feet (meters) plus working load designation.

Available Support Spans: 8, 10, 12, 16, and 20 feet (2440, 3048, 3660, 4870, and 6090 mm).

Working Load Designation:
A - 50 pounds per foot (74.4 kg/m).
B - 75 pounds per foot (111.6 kg/m).
C - 100 pounds per foot (148.8 kg/m).

For example, Class 20C applies to cable tray required to span 20 feet (6090 mm) between supports while supporting cable static weight between 75 and 100 pounds per foot (111.6 and 148.8 kg/m).

Consult NEMA VE 1 for additional information and safety factors.
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2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with these specifications, wire basket cable tray systems to be installed shall be as manufactured by the following:
   1. Atkore – Cope
      11500 Norcom Rd
      Philadelphia, PA 19154

TOLL-FREE / 800-882-5543
https://www.copecabletray.com/

2. Engineer approved equivalent.

2.2 CABLE TRAY SECTIONS AND COMPONENTS

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[] denotes a variable or choice
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A. General: Except as otherwise indicated, provide metal cable trays, of types, classes and sizes indicated; with splice plates, bolts, nuts and washers for connecting units. Construct units with rounded edges and smooth surfaces; in compliance with applicable standards.

B. Materials and Finish: Material and finish specifications for each tray type are as follows:

1. Aluminum: Straight section and fitting side rails and rungs shall be extruded from Aluminum Association Alloy 6063. All fabricated parts shall be made from Aluminum Association Alloy 5052.
2. Pre-galvanized Steel: Straight sections, fitting side rails, rungs, and covers shall be made from steel meeting the minimum mechanical properties and mill galvanized in accordance with ASTM A653 SS, Grade 33, coating designation G90.
3. Hot-dip Galvanized Steel: Straight section and fitting side rails and rungs shall be made from steel meeting the minimum mechanical properties of ASTM A1011 SS, Grade 33 for 14 gauge and heavier, ASTM A1008, Grade 33, Type 2 for 16 gauge and lighter, and shall be hot-dip galvanized after fabrication in accordance with ASTM A123. All covers and splice plates must also be hot-dip galvanized after fabrication; mill galvanized covers are not acceptable for hot-dipped galvanized cable tray. All hot-dip galvanized after fabrication steel cable trays must be returned to point of manufacture after coating for inspection and removal of all icicles and excess zinc. Failure to do so can cause damage to cables and/or injury to installers.
4. Stainless Steel: Straight section and fitting side rails and rungs shall be made of AISI Type 304 or Type 316 stainless steel.

2.3 TYPE OF TRAY SYSTEM

A. Ladder type trays shall consist of two longitudinal members (side rails) with transverse members (rungs) swaged to the side rails. Rungs shall be spaced [6] [9] [12] inches on center. Spacing in radiused fittings shall be 9 inches and measured at the center of the tray's width. No portion of the rungs shall protrude below the bottom plane of the side rails. **Each rung must be

capable of supporting the maximum cable load, with a safety factor of 1.5 and a 200 pound concentrated load when tested in accordance with NEMA VE-1, section 5.4.

B. I-Beam Ladder has side rails that are I-Beam profiles with rungs that are 11/8 square tubes with open slot facing down. These are of arc-welded construction.
   1. Standard Ladders & Ventilated/Trof consist of 11/8" Square tubular rungs with 6", 9", 12" Rung spacings 5" Rung spacing for trof trays ·Rungs have large radius corners.
   2. Solid Bottoms trays consist of a solid, 0.040" flat sheet on top of ladder rungs on 12" centers. Bottoms can be located under rungs or located on top of and under rungs (double bottom)

C. Ventilated trough type trays shall consist of two longitudinal members (side rails) with a corrugated bottom welded to the side rails. The peaks of the corrugated bottom shall have a minimum flat cable-bearing surface of 5/8 inch and shall be spaced 2 inches on center. To provide ventilation in the tray, the valleys of the corrugated bottom shall have ½ inch round holes punched along the width of the bottom.

D. Solid bottom trough type trays shall consist of two longitudinal members (side rails) with a corrugated bottom welded to the side rails. The peaks of the corrugated bottom shall have a minimum flat cable-bearing surface of 5/8 inch and shall be spaced 2 inches on center.

E. Tray Sizes shall have [3] [4] [5] [6] inch minimum usable load depth, or as noted on the drawing.

F. Straight tray sections shall have side rails fabricated as C-Channels. All straight sections shall be supplied in standard [10] [12] [20] [24] foot lengths, except where shorter lengths are permitted to facilitate tray assembly lengths as shown on drawings.

G. Tray widths shall be [6] [9] [12] [18] [24] [30] [36][42][48] inches or as shown on drawings.

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Not all sizes and lengths are available in all styles of cable tray.

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2.4 CABLE TRAY ACCESSORIES

A. All fittings must have a minimum radius of [12] [24] [36] [48] inches.

B. Splice plates - shall be the bolted type made as indicated below for each tray type. The resistance of fixed splice connections between adjacent sections of tray shall not exceed .00033 ohms. Splice plate construction shall be such that a splice may be located anywhere within the support span without diminishing rated loading capacity of the cable tray.
   1. Aluminum Tray - Splice plates shall be made of 6063-T6 aluminum, using ribbed neck spline bolts and serrated flange locknuts. Hardware shall be zinc plated in accordance with ASTM B633, SC1.

2. Steel (including Pre-galvanized and Hot-dip galvanized) - Splice plates shall be manufactured of high strength steel, meeting the minimum mechanical properties of ASTM A1011 Grade 33. Each splice plate shall be attached with ribbed neck spline bolts and serrated flange locknuts. Hardware shall be zinc plated in accordance with ASTM B633 SC1 for pre-galvanized and hot-dip galvanized cable trays unless otherwise noted.
3. Splice plates shall be furnished with straight sections and fittings.

C. Cable Tray Supports - Shall be placed so that the support spans do not exceed maximum span indicated on drawings. Supports shall be constructed from 12 gauge steel formed shape channel members 1-5/8 inch by 1-5/8 inch with necessary hardware such as the Trapeze Support Kits T200E as manufactured by Cope Cable Tray. [or engineer approved equal]. Cable trays installed adjacent to walls shall be supported on wall mounted brackets such as Cope 9037 or 9036 series brackets [or engineer approved equal].
D. Trapeze hangers and center-hung supports shall be supported by [3/8] [1/2] inch (minimum) diameter rods.
E. Barrier Strips - Shall be placed as specified on drawings and be fastened into the tray with self-drilling screws or U-bolts with acorn nuts.
F. Cable Tray Hold Downs – Cable tray supported on standard 1-5/8 inch strut shall be held down with Cope style hold-down brackets. Such as the 9131 series for ladder type cable trays and 90XX series for trough and hat series. 9132 or 9133 series hold downs to be used when supporting the cable tray vertically on standard 1-5/8 inch strut
G. Cable Cleats - shall be Talon® T1 Cable Cleats or Talon® T3 cable cleats.
H. Accessories - special accessories shall be furnished as required to protect, support, and install a cable tray system. Accessories shall consist of, but are not limited to: section splice plates, expansion plates, blind-end plates, specially designed ladder dropouts, barriers, and hold down clips.

2.5 LOADING CAPACITIES

A. Cable tray shall be capable of carrying a uniformly distributed load of [__] lbs. /ft. on a [____] foot support span with a safety factor of 1.5 when supported as a simple span and tested per NEMA VE1 Section 5.2. **In addition to the uniformly distributed load the cable tray shall support a 200 lb. concentrated load at mid-point of span and centerline of tray. **Load and safety factors specified are applicable to both side rails and rung capacities. **Omit as needed.

PART 3 EXECUTION

3.1 EXISTING WORK

3.2

A. Contractor or approved sub-contractor to remove exposed abandoned cable tray, including abandoned cable tray above accessible ceiling finishes. Remove supports. Cut wire basket cable tray flush with walls and floors, and patch surfaces.
B. Contractor or approved sub-contractor to maintain access to existing wire basket cable tray and other installations remaining active and requiring access. Modify installation or provide access panel.
C. Contractor or approved sub-contractor to extend existing wire basket cable tray installations using materials and methods [compatible with existing electrical installations, or] as specified.
D. Contractor or approved sub-contractor to clean and repair existing wire basket cable tray to remain or to be reinstalled.

3.3 INSTALLATION

A. Install cable trays as indicated: Installation shall be in accordance with equipment manufacturer's instructions, and with recognized industry practices to ensure that cable tray equipment comply with requirements of NEC and applicable portions of NFPA 70B. Reference NEMA-VE2 for general cable tray installation guidelines.
B. Coordinate cable tray with other electrical work as necessary to properly integrate installation of cable tray work with other work.
C. Provide sufficient space encompassing cable trays to permit access for installing and maintaining cables.
D. Cable tray fitting supports shall be located such that they meet the strength requirements of straight sections. Install fitting supports per NEMA VE-2 guidelines, or in accordance with manufacturer's instructions.
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. For adjustable splices and expansion areas, copper bonding jumpers must be used when using the system as an EGC.
F. Support trays and fasten to structure. Install supports at each connection point, at end of each run, and at other points to maintain spacing between supports of [_____] feet ([_____] cm) maximum. Use manufacturer recommended size for cantilever brackets. Installation of oversized or undersized cantilever brackets may lead to system failure.
G. Cable tray should be free of burrs and sharp edges.
H. Cable tray shall be grounded according to manufacturer’s specifications.
I. Divided cable runs shall be kept separate with a solid barrier.

3.4 TESTING

A. Test cable trays to ensure electrical continuity of bonding and grounding connections, and to demonstrate compliance with specified maximum grounding resistance. See NFPA 70B for testing and test methods.
B. Manufacturer shall provide test reports witnessed by an independent testing laboratory of the "worst case" loading conditions outlined in this specification and performed in accordance with the latest revision of NEMA VE-1; including test reports verifying rung load capacity in accordance with NEMA VE-1 Section 5.4.