**SECTION 26 05 36**

**CABLE TRAYS FOR ELECTRICAL SYSTEMS**

**BASED ON DFD MASTER ELECTRICAL SPEC DATED 03/01/21**

This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, or modify what is currently written. The Division of Facilities Development expects changes and comments from you.

This section includes language relevant to multiple divisions of work (26, 27, and 28) and may be referenced in specification sections for those divisions of work. Coordinate the content with those sections and, where applicable, designers responsible for those sections.

The DFD discourages the use of cable tray penetrations thru rated walls. Use rated conduit assemblies for such penetrations instead, and note their location, size, quantity, and hourly rating on the plans.

**PART 1 - GENERAL**

**SCOPE**

The work under this section includes furnishing of all labor, material, supports and services to install a complete cable tray system as shown and or indicated on the drawings. The cable tray system is defined to include, but not limited to, straight sections of cable tray, bends, tees, elbows, drop-outs, supports and all other related accessories necessary for a complete installation. Included are the following topics:

PART 1 - GENERAL

 Scope

 Related Work

 References

 Submittals

PART 2 - PRODUCTS

 Wire Basket Cable Tray and Components

PART 3 - EXECUTION

 Installation

 Construction Verification Items

**RELATED WORK**

Applicable provisions of Division 1 govern work under this Section.

Section 01 91 01 or 01 91 02 – Commissioning Process

Section 26 05 29 – Hangers and Supports for Electrical Systems

Section 26 08 00 – Commissioning of Electrical

**REFERENCES**

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 ‑ Specification for Zinc (Hot‑Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip

ASTM A510 - 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 B 633 - Specification for Electro-deposited Coatings of Zinc on Iron and Steel

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

ASTM A653/A653M-00 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process

ASTM D769 - Standard Specification for Black Synthetic Iron Oxide

NEMA VE 1 ‑ Metal Cable Tray Systems

NEMA VE 2 - Metal Cable Tray Installation Guidelines

**SUBMITTALS**

Shop Drawings: Indicate tray type, dimensions, support points, and finishes.

Product Data: Provide data for tray sections, connector assemblies, clamp assemblies, brackets, splice plates, splice bars, grounding clamps, hold-down plates, support hardware, and accessories.

Detailed sketch of proposed method(s) of installation.

Manufacturer's Instructions: Indicate 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.

**PART 2 - PRODUCTS**

**WIRE BASKET CABLE TRAY and COMPONENTS**

Description: Continuous, rigid, welded steel wire mesh cable support system.

Material: Carbon steel wire, ASTM A510, Grade 1008. Wire shall be welded, bent and surface treated after manufacture.

Finish: Electro-Plated Zinc Galvanizing per ASTM B633, Type III, SC-1, or Electro-plated yellow zinc dichromate in accordance with ASTM B633 SC2.

Wire diameter shall be 0.195” (5mm) minimum on all mesh sections or as required to meet application load requirements.

Wire Mesh to be welded at all intersections. Each wire end shall be rounded along tray sides for safe handling and to protect cables from damage.

All straight section longitudinal wires shall be constructed with a continuous top wire safety edge. Safety edge must be T-welded on all tray sizes.

Dimensions:

* Mesh Dimension: 2 x 4 inches.

Confirm tray size is indicated on drawings. Otherwise, specify required width(s).

* Inside Width: [As indicated on Project Drawings] [\_-inches].

4-inch depth is typical. Use shallow depth for low cable counts. Use deeper tray where additional capacity is required and cannot be accommodated by wider tray.

* Inside Depth: [4] [2] [As indicated on Project Drawings] [\_-inches].

Bends/Reducers/Tees/Horizontal and Vertical Offsets: These may be factory manufactured or field fabricated in accordance with manufacturer's instructions.

* Provide manufactured “Radius shield” for a smooth inside radius surface.

Support System: A cable tray support system incorporating mechanisms for wall installation, trapeze, center support, or under-floor mounting. Supports shall comply with product requirements defined in specification section 26 05 29.

Hardware: Hardware, including splice connectors and support components, shall be furnished by cable tray manufacturer.

Grounding: Assembled tray shall be UL classified as an equipment grounding conductor.

WARNING LABELS

Engraved or printed nameplates shall include the following or similar language:

Warning! Do not use cable tray as walkway, ladder, or support for ladders or personnel.

**PART 3 - EXECUTION**

**INSTALLATION**

Install in accordance with manufacturer's instructions.

Install metallic cable tray in accordance with NEMA VE-1 and VE-2.

Provide manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors, and grounding straps as required.

Conduit connections to the tray shall be made with an UL approved clamps, manufactured specifically for the purpose.

**Coordination**

The Contractor shall coordinate the installation of the cable tray with plumbing and HVAC Contractors so that clearance as described in the “Clearances” article below is maintained between the cable tray and other trade’s work. This clearance shall be a minimum of one (1) foot on both sides of the cable tray (one side if wall mounted) and eight (8) inches on top of the cable tray. Tray shall not restrict removal of ceiling panels nor lighting assemblies. If these conditions cannot be met, this Contractor shall notify the DFD Representative for clarification and direction before proceeding with installation.

**Do not install cable tray below re-heat coils, traps, etc. In those areas that have no option furnish and install a manufacturer approved cover extending 12” on either side.**

**Clearances**

Minimum separation distances between communications wires and cables, and any electric light, power, Class 1, non-powered fire alarm, or medium power network-powered broadband communications circuit shall comply with NEC Article 800.

In addition, to reduce or eliminate EMI, the following minimum separation distances shall be adhered to:

Thirty-nine (39) inches from transformers and motors.

Balanced twisted-pair cabling installed in cable tray shall be separated from fluorescent lamps and associated fixtures by a minimum of 5 inches (125 mm).

Zero pathway separation distance is permitted when the electrically conductive telecommunications cables, the power conductors or both are enclosed in metallic pathways that meet the following conditions:

* + the metallic pathway(s) completely enclose the power conductors and are continuous;
	+ the metallic pathway(s) are properly bonded and grounded per ANSI/TIA-607-B; and
	+ the walls of the pathway(s) have a minimum thickness 1 mm (0.04 in) nominal if made of steel (1/2” EMT minimum)
	+ No separation is required between power and telecommunications cables crossing at right angles.

**Support**

No conduit shall be attached to the cable tray except for the conduits that terminate at the cable tray. Cable tray supports can be used to support conduit. Do not use more than 1/2 of the cable tray support for conduit support.

Support trays in accordance with Section 26 05 29. Provide supports at each connection point, at the end of each run, and at other points to maintain spacing between supports of 8 ft (2.5 m) maximum.

All of the threaded rod used for the tray support shall be 3/8" diameter for 12" wide tray and 1/2" minimum for tray larger than 12" wide.

Where a single Center Support is used for 12” wide tray, threaded rod shall be 1/2".

Bolts and nuts shall be installed in all holes of the cable tray splice plates per the manufacturer’s instructions for installation.

***Provide cable tray support details on the drawings.***

Tray support shall be installed in a trapeze, wall angle, or center support configuration as shown on the plans, outlined in the spec, and approved by the project engineer. Center support is allowed on 12” wide and less cable tray.

Supports shall be formed shape channel trapeze members per section 26 05 29, or formed mounting assemblies that are part of the manufacturer’s integrated cable tray system, complete with nuts, bolts, washers, lock washers and tray clamps as required for a complete and finished installation.

Submit complete detailed sketch(es) for approval of the actual proposed method(s) of installation.

The maximum allowable deviation of the tray, from the level horizontal plane measured across the width of the tray, is one half of one inch (1/2"), with the tray loaded to capacity, as allowed by the NEC.

The approval of the installation method does not relieve this contractor from meeting the above deviation requirement. If additional support is needed, as determined by the project engineer, this contractor shall furnish and install the additional support at no additional cost to the State.

**Fittings and Hardware**

Use manufactured expansion fittings where required at the building expansion joints and as required by the manufacturer.

Nuts, bolts, washers, rod, etc. shall be plated.

Provide End-of Run Drop-out (4-inch radius; minimum) at terminus of cable tray at equipment room(s) and wherever tray is discontinuous and there is a change in height.

Provide threaded rod protector sleeves over all threaded rod supporting the tray. Protectors shall extend above the tray a minimum of eight (8) inches.

**Grounding and Bonding**

Ground and bond cable tray under provisions of Section 26 05 26.

Provide electric continuity between tray components. Provide manufacturer’s grounding clamps as required. Use anti‑oxidant compound to prepare aluminum contact surfaces before assembly if required by the manufacturer. Assembled tray shall be UL classified as an equipment grounding conductor.

Provide #4 AWG bare stranded copper equipment grounding conductor through entire length of tray. Bond equipment ground conductor to each component, each tray section, and connect to the main building equipment grounding conductor.

*Exception:* Equipment grounding conductor is not required in telecommunications applications provided that the tray is UL-Listed for grounding and is installed as specified to maintain electrical continuity along the entire length of the cable tray.

Bond cable tray to the telecommunication grounding bar or conductor in each equipment room (#6 AWG minimum).

Equipment grounding conductor connections to the tray shall be made using a UL listed mechanical connection. Sheet metal or TEK screws shall not be used for grounding. Split bolts may be used for connection to wire-basket type trays.

**Penetrations**

Rated Penetrations

Where cable tray is to penetrate a fire rated wall or floor, the following installation method shall be used by this contractor:

1. Stop the tray at the penetration and fasten the tray end to the wall/floor.
2. Provide a manufactured re-enterable system that features a built-in fire and smoke sealing system that allows cables to be added or removed without the need to remove or reinstall fire stopping materials. Capacity (for cabling) of the system shall match that of the cable tray. Refer to specification Section 07 84 00 - FIRE STOPPING.
3. Install re-enterable system per manufacturer’s instructions.
4. Bond each re-enterable system to the equipment grounding conductor (or cable tray, if it is listed by a Nationally Recognized Testing Laboratory (NRTL) as an equipment grounding conductor) with a minimum #6 stranded copper wire using a NRTL listed connector.

Non-rated Penetrations

In non-rated penetrations where the contractor is able to create an opening of sufficient size, cable tray may simply pass through such an opening without providing conduit sleeves.

Where cable tray is to penetrate a non-rated wall or floor, and the cable tray cannot be made continuous for reasons other than rating, the following installation method shall be used by this contractor:

1. Stop the tray at the penetration and fasten the tray end to the wall/floor.
2. For every 6" of tray width, furnish and install a 4" PVC sleeve or rigid galvanized nipple (threaded at both ends) through the penetration extending 4" beyond both sides and supported per section 26 05 29.
3. Provide a fiber or plastic bushing on both ends of the PVC sleeve, or for a rigid galvanized nipple, provide a fiber or plastic bushing on one end and a ground bushing on the other end.
4. Bond each grounding bushing to the equipment grounding conductor (or cable tray, if it is listed by a Nationally Recognized Testing Laboratory (NRTL) as an equipment grounding conductor) with a minimum #6 stranded copper wire using a NRTL listed connector.
5. Completely seal the annular space between the wall and conduit sleeve with urethane caulk.
6. Plug the conduits with material to prevent sound or odor transmission.

**Warning Signs**

Provide warning signs at 15-foot intervals along cable tray. Adjust labeling interval to ensure that signs are visible.

**Field Fabricated Corners, Offsets, or Reducers**

Where Wire Basket Tray corners, offsets, or reducers are field fabricated, cut wires:

* In accordance with manufacturer's instructions.
* Using side action bolt cutters to ensure integrity of galvanic protective layer.
* With one clean cut to eliminate grinding and/or touch-up.
* Ensure that no sharp edges remain after field fabrication

**CONSTRUCTION VERIFICATION**

Contractor is responsible for utilizing the construction verification checklists supplied under specification Section 26 08 00 in accordance with the procedures defined for construction verification in Section 01 91 01 or 01 91 02.

END OF SECTION