

CTI TECHNICAL BULLETIN

Number 4: A publication of the Cable Tray Institute

Cable Tray Type Selection

With all the choices in cable trays styles, ladder, ventilated, solid bottom and wire basket, it can be difficult to know which is the right one for your application.

This bulletin will help provide a few guidelines to consider when deciding which style to use.

First the engineer or designer should select the type of cable tray that has the features which best serve the project's requirements.

Second it is important to know what the National Electrical Code (NEC) specifies for various cable types and applications.

In Class II, Division 2 Hazardous (Classified) Locations (Dust), the types of cables that are allowed to be installed in cable trays must be in ladder or ventilated trough cable trays. Solid bottom cable trays are not allowed to be installed in Class II, Division 2 locations [2017 NEC 502.10 (b)(1)(6)].

Ladder Cable Tray

Ladder tray is predominate cable tray type in large part because of the design incorporates a number of desirable features:

- A ladder cable tray without covers permits the maximum free flow of air across the cables. This allows the heat produced in the cable's conductors to effectively dissipate. Under such conditions, the conductor insulation in the cables of a properly designed cable tray wiring system will not exceed its maximum operating temperature. The cables will not prematurely age due to excessive operating temperatures.
- The rungs of the ladder cable trays provide convenient anchors for tying down the cables in the non-horizontal cable tray runs or where the positions of the cables must be maintained in the horizontal cable tray runs. This capability is a must for single conductor cable installations. Under fault conditions (short circuit), the magnetic forces produced by the fault current will force the single conductor cables from the cable tray if they are not securely anchored as in a design power system.
- Cables may exit or enter the ladder cable trays through the top or the bottom of the cable tray. Where the cables enter or exit conduit, the conduit to cable tray clamps may be installed upright or inverted to terminate conduits on the top or bottom of the cable tray side rail.
- Moisture can't accumulate in ladder cable trays.
- If cable trays are being installed where working space is a problem, hand access through the cable tray bottom may help to facilitate the installation of small diameter cables: control instrumentation, signal, etc.
- The most common rung spacing for ladder cable tray is 9 inches. This spacing may be used to support all sizes of cables. This spacing is desirable for the small diameter Type PLTC and TC cables as the support distance is such that there is no visible

drooping of the small cables between rungs. 12 or 18 inch rung spacing provides adequate cable support but the slight amount of small diameter cable drooping between rungs may be aesthetically objectionable for some installations. The maximum allowable distance between supports for 1/0 through 4/0 AWG single conductor cables is 9 inches [2017 NEC Section 392.10(B)(1)(a)].

Ventilated (Channel) Trough Cable Tray

While ventilated cable trays maybe chosen for aesthetic reasons they do offer many of the same advantages as ladder trays and often at a lower cost. However it is important to note that this lower cost often comes with a decreased load weight and support span versus traditional ladder tray styles. Ventilating cable trays offer a number of desirable features:

- A ventilated cable tray without covers permits the free flow of air across the cables. This allows the heat produced in the cable's conductors to effectively dissipate. Under such conditions, the conductor insulation in the cables of a properly designed cable tray wiring system will not exceed its maximum operating temperature. The cables will not prematurely age due to excessive operating temperatures.
- The perforations in ventilated tray provide convenient anchors for tying down the cables in the non-horizontal cable tray runs or where the positions of the cables must be maintained in the horizontal cable tray runs. This capability is a must for single conductor cable installations. Under fault conditions (short circuit), the magnetic forces produced by the fault current will force the single conductor cables from the cable tray if they are not securely anchored to the cable tray.
- Moisture does not accumulate as easily in ventilated cables trays but they still do not provide the same level of drainage that ladder trays do.
- Ventilating cable trays often cost less than ladder trays but do not offer as wide a support span as ladder trays do.

Solid Bottom Cable Tray

The choice to use solid bottom trays often for aesthetic purposes, however solid bottom trays provide no distinctive advantages.

Solid bottom trays may provide additional protection against mechanical damage, however, has limited drainage and air flow.

Some engineers and designers specify solid bottom cable trays (often with covers) in the belief that all electrical circuits have to be totally enclosed by metal. This is incorrect. The NEC draws a distinction between cable trays and raceways [2017 NEC 392.1] "Cable trays are mechanical support systems and not raceways". Cable failures in cable tray runs rarely happen. Cable failures due to cable support problems in cable trays are nonexistent.

Wire Mesh Cable Tray

Wire mesh cable trays light weight and ability to be easily modified in the field make them a popular choice for many installations. However it is important to note that this lower cost often comes with a decreased load weight and support span versus traditional ladder tray styles and even some ventilating options. Wire mesh cable trays offer a number of desirable features:

- A wire mesh cable tray without covers permits the free flow of air across the cables. This allows the heat produced in the cable's conductors to effectively dissipate. Under such conditions, the conductor insulation in the cables of a properly designed cable

- tray wiring system will not exceed its maximum operating temperature. The cables will not prematurely age due to excessive operating temperatures.
- The large grid pattern of the tray provides convenient anchoring for tying down the cables in the non-horizontal cable tray runs or where the positions of the cables must be maintained in the horizontal cable tray runs. This capability is a must for single conductor cable installations. Under fault conditions (short circuit), the magnetic forces produced by the fault current will force the single conductor cables from the cable tray if they are not securely anchored as in a design power system.
 - Moisture can't accumulate in wire mesh trays.

Wire Mesh trays are often lowest cost option but do not offer as wide a support span as ladder trays and ventilated trays do.

A PUBLICATION OF THE CABLE TRAY INSTITUTE

1300 North 17th Street, Suite 900, Rosslyn, Virginia 22209

www.cabletrays.com