

# ***CTI* TECHNICAL BULLETIN**

Number 5: A publication of the Cable Tray Institute

## **Tie Down Practices for Multiconductor Cables in Cable Trays (note single conductor practices are to covered in a new bulletin) Revised 6/10/06**

There are three items which require decisions concerning the tying down of multiconductor cables in cable tray wiring systems. Item #1 is to define under what conditions the multiconductor cables in cable trays are to be tied down. Item #2 is to define the frequency at which the multiconductor cables are to be tied down. Item #3 is to select the ties that have the proper characteristics for the specific installations. In the following material, where the word cable is used it means multiconductor cable.

### **Item #1- Conditions Requiring Cable Tie Down:**

The reasons for tying down cables are to keep them in the cable trays, to maintain the proper spacing between cables, or to confine the cables to specific locations in the cable trays. National Electrical Code Section 392.8(B) states that in other than horizontal cable tray runs, the cables shall be fastened securely to transverse members of the cable trays. In horizontal cable tray runs, cables are not required to be tied down. The cable's weight will keep them in the cable trays. In non-horizontal cable tray runs, the cables must be tied down. For a vertical cable tray installation, the cables may hang away from the cable tray if they are not tied down. The more flexible small diameter cables will hang further away from the cable trays than the large diameter cables if they are not tied down. The smaller diameter cables will need to be tied to the cable tray more frequently than the stiff large diameter cables.

Cable installations as per the 2005 NEC, sections 392.11(A) (3) and 392.13(A)

392.13(A) permit higher ampacities, even the free air rating of the cable, where cables are installed in a single layer, in uncovered trays, with a maintained spacing not less than one cable diameter between cables. Cable ties maintain this spacing and thereby permit higher ampacities.

There are installations where the owner may want the cables tied down to guarantee the separation of low energy signal cables and power cables. This condition may also be obtained by installing a permanent barrier in the cable tray.

For installations where a single large cable or several cables are installed in ventilated channel cable trays, it is at times desirable to tie the cables to the horizontal as well as to the non-horizontal ventilated channel cable trays. Then if an abnormal condition occurs, the cables would not be knocked out of the ventilated channel cable trays which are only 1 1/2 inches high.

Where Type MI cables are installed that are to have two hour fire resistant ratings, the MI cables must be securely supported every three feet. A desirable installation would be to install the MI cable in steel cable trays and to use stainless steel ties to secure the MI cable to the cable tray every three feet.

Where cables drop from the cable trays to equipment enclosures, it may be desirable to anchor the cables to the last one, two or three rungs before the drop depending on the size of the cables. This easily provides distributed secured support for the cables when the length of cable between the cable tray and the equipment enclosure is six feet or longer.

### **Item #2 - Comments on Cable Tie Down Frequencies:**

The NEC doesn't specify any distances between ties for cables in cable tray wiring systems. This is a decision that must be made by those designing and installing the cable tray wiring systems. It is desirable to develop some standards for this activity.

A conservative recommendation for non-horizontal cable trays is that the small diameter cables (diameters less than 1 inch) be tied down at approximately 3 foot intervals and that cables 1 inch and larger be tied down at approximately 6 foot intervals.

The vertical cable wiring system installations that contain horizontal bends require the cables to be tied down at every or every other rung in the bend and to the first rung before entering the bend and the first rung after exiting the bend.

In horizontal cable trays where cable spacing is to be maintained, the cables should be tied down at approximately 10 foot intervals. For horizontal ventilated channel cable trays, there are installations containing a single large cable or several cables where it is desirable to tie down the cables at approximately 10 foot intervals.

### **Item #3 - Comments on the Types of Cable Ties:**

Designers should select cable ties that have the proper characteristics for the specific installations. The initial installation of the wrong cable ties may require maintenance expenditures to replace the cable ties. Plastic ties that are not ultraviolet resistant will fail in one to two years if they are installed where they are exposed to the rays of the sun. Where both indoor and outdoor cables are to be tied down on the same project, it is best to have only ultraviolet resistant ties on the project and use them on both the indoor and the outdoor cables. This way it will not be possible to have the incorrect type of ties for the outdoor cables.

When selecting cable ties the following must be considered: moisture resistance, ultraviolet resistance, extremely high ambient temperatures, extremely low ambient temperatures, chemical resistance, flammability (UL 94 V-O flammability rating), low smoke characteristics, tensile strength, appropriate lengths (the surplus lengths of the

cable ties are cut off so it is possible to use one tie length as standard where many different lengths are required). There are quality plastic ties available that if properly applied have a life span of up to 20 years. There are non-magnetic stainless steel ties as well as the plastic ties. The stainless steel ties are capable of satisfactorily satisfying a wide range of requirements.

A PUBLICATION OF THE CABLE TRAY INSTITUTE

---

1300 North 17<sup>th</sup> Street, Suite 1752, Rosslyn, Virginia 22209

[www.cabletrays.com](http://www.cabletrays.com)