

CTI TECHNICAL BULLETIN

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Grounding Inspection of Steel and Aluminum Cable Tray Systems

It is essential that the grounding of cable tray systems, including the cables in the tray systems, is inspected for compliance with the grounding requirements in the National Electrical Code (NEC) **BEFORE** the cabling in the tray is energized and **BEFORE** cable is installed. If cable is installed, then it is possible to energize the cable before a grounding inspection. It is also easier to do the cabletray grounding inspection if the tray system does not have cable installed.

Electrical grounding is essential for personal safety and protection against arcing that can occur in any part of the wiring system, motor enclosures, conduits, etc. The owner, engineering firm, or their designated representatives should provide approval of the inspection.

For safety reasons, the grounding should be right before the wire is energized. This is true for cable tray, conduit, cable, or any electrical system. The grounding inspection should start with the installation and should continue until all tray sections are connected together, either by bolted connections or bonding jumpers.

Steel and aluminum cable tray systems are excellent equipment grounding conductors if they are properly designed, specified, installed, and inspected. The NEC requirements for cable tray grounding are found in NEC Sections 318-3c, 318-7, and Table 318-7(b)(2).

For the cable tray to be used as an equipment grounding conductor, the tray must be used where continuous maintenance and supervision ensure that qualified persons will service the installed cable tray system and that cable tray section must be:

1. Marked as "Classified by U.L. as to its suitability as an Equipment Grounding Conductor."
2. Marked with the minimum cross sectional area of the tray.

Grounding inspection consists of verifying that all cable tray sections are marked as indicated above.

This can easily be accomplished as each part of the tray system is installed. If the cable tray system is not specified or marked as an equipment grounding conductors then either a single conductor equipment ground conductor must be installed in the tray or equipment ground conductors must be provided in the cables installed in the tray system.

The equipment ground conductor is so important that some companies use ground conductors in the cable and the cable tray as an EGC. Many companies are moving towards ground conductors in the cable for added reliability.

A single conductor ground conductor can be installed in and bonded to the cable tray sections. NEC section 318-3(b)(1), exception number 2 permits single conductor cables in sizes #4 AWG or larger either insulated, covered, or bare as equipment grounding conductors. The minimum size is based on NEC Table 250-95 based on the highest fuse rating or circuit breaker setting for any circuit in the tray system.

In a moisture laden environment where aluminum tray is used a bare copper conductor should not be used to avoid galvanic corrosion; an aluminum conductor should be used with the proper listed connectors to bond tray sections together.

Equipment ground conductors in TC cables are sized to meet NEC Table 250-95. In cables #8 gauge copper or larger, they are separate conductors either bare or insulated. In cables #10 gauge copper, a fourth conductor, the same size as the phase conductor, can be used or marked as an equipment ground conductor in industrial facilities.

Grounding inspection should verify that the cable tray is marked as an equipment grounding conductor, this is always preferred, or a single conductor equipment ground conductor is installed and bonded to the cable tray sections, or equipment ground conductors are provided in the cables.

Regardless of which type of equipment grounding system used, cable tray systems must be electrically continuous and effectively bonded and grounded per Section 250-75 in the NEC.

The most important bonding jumper is the connection from the tray system to the power source at the MCC or switchgear. It is good practice to provide bonding jumpers from both side rails of cable tray section at the MCC or switchgear to the ground bus in the equipment. Verify that these bonding jumpers are provided. Bonding can also be accomplished by direct bolted connections to cable tray sections.

Bonding jumpers are not required across standard splice plates because bolted connections provide adequate bonding. Bonding jumpers are required at adjustable splice plates, expansion splice plates, or at discontinuous tray sections.

Cable dropouts from the tray system to various types of enclosures must provide bonding to the tray system either by bolted connections to channel dropouts (use at least two bolts), grounding conductors in the cable or bonding jumpers for cable dropouts, or conduit-to-cable tray adapters as indicated in figures 4.48 through 4.5 for NEMA VE-2. Note: if adapters are not listed for grounding, bonding jumpers are required.

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