

# **Grounding and bonding telecommunications/datacom systems**

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With the increasing demand for computer network installations, telecommunications grounding and bonding has become a growing opportunity for electrical contractors. Although similar grounding principles apply, understanding the telecommunications terminology and special considerations has been a challenge. To help get through the industry's jargon, this article will define terms and discuss the basic schematics of a properly grounded and bonded telecommunications network.

As with traditional electrical grounding, telecommunications networks and equipment should be grounded to the electrical service. However, simply grounding to structural steel isn't enough when tackling telecommunications systems. The sensitivity of the electronic equipment requires that the telecommunications cabling and power be effectively equalized to prevent loops or transients that can damage the equipment. This means designing a complete grounding and bonding system that goes beyond the basic "green-wire" methodology.

Unpredictable and intermittent data loss and outright computer failure can result from a transient. To help ensure the safety and operation of sensitive computer equipment, as well as the safety of personnel, the electrical contractor should install an effective grounding system that will circumvent such disturbances.

To ensure effective equalization, the telecommunications ground should be directly attached to the electrical service ground. However,

an electrode such as a ground rod or other grounding electrode system can be used when no electrical service is present.

## **Schematics of telecom grounding**

In general, a telecommunications grounding system contains the following components:

- \*Telecom bonding conductor
- \*Telecom main grounding bus bar (TMGB)
- \*Telecom bonding backbone (TBB)
- \*Telecom grounding bus bar (TGB)
- \*Telecom bonding backbone interconnecting bonding conductor (TBBIBC)

The system begins at the electrical service entrance, travels to the TMGB and continues through to each TGB located in individual telecommunications closets on each floor of the building structure, finally looping back around to the original TMGB.

The telecommunications entrance facility (TEF) includes the entrance point at the telecommunications service and also the space where the inter- and intra-building backbone facilities join. Telecommunication-related antenna entrances and electronic equipment may be located in the TEF.

## **Telecom main grounding bus bar (TMGB)**

The TMGB is the dedicated extension of the building grounding electrode system for the telecommunications infrastructure. Because it is the central attachment point for TBBs and equipment, the TMGB should provide easy access for telecommunications personnel.

The TMGB is a predrilled copper bus bar with standard NEMA bolt-hole sizing and spacing for the particular lug connection that will be used. It should be large enough to satisfy today's applications and accommodate future growth. A minimum of 6-mm thickness and 100-mm width is required. Many varieties of ground bars are available, and some come as a kit and can be customized to meet the specific requirements of the application. Prewelded Cadweld pigtailed are



available in a variety of conductor sizes and lengths, insulated or bare, ready to be attached to the building ground.

For reduced resistance, electro-tin plating is preferred. However, if not plated, the mating surfaces must be completely cleaned. Where telecommunications panel boards are located with the TMGB, they must have the alternating current equipment ground bus (or a metallic enclosure) bonded to the TMGB/TGB. All appropriate clearances should be maintained while locating TMGBs as close as possible to the panel boards.

Connections to the TMGB or lugs should be exothermic welds. Exothermic welds provide a connection that helps ensure the long-term integrity of the grounding system.

### **Telecom bonding backbone (TBB)**

The TBB is a conductor that connects all TGBs with the TMGB. It reduces or equalizes potential differences between the telecommunications systems to which it is bonded. The TBB should not be the only conductor that provides a ground fault current return path.

Starting at the TMGB, the TBB loops throughout the building via telecommunications backbone pathways. It connects TGBs in every telecommunications closet and equipment room within the building. Multiple TBBs may be necessary, depending on the size of the structure and the number of TGBs in the building. Water pipes or metallic cable shield should not be used as telecommunications bonding backbone.

Each TBB should be an insulated copper conductor, a minimum of No. 6 AWG and possibly as large as 750 kc mil often used by telephone and communications companies. In a multi-story building where more than one TBB is used, the TBBs must be bonded together with a TBB interconnection-bonding conductor (TBBIBC) located on the top floor and at least every third floor. Telecom Grounding Bus bar (TGB)

A TGB is a predrilled copper bus bar with standard NEMA bolt hole sizing and centrally connected systems and equipment served by a telecommunications closet. It should be at least 6-mm thick by 50-mm wide. Just like the TMGB, the TGB should be electro tin-plated or cleaned prior to connecting the conductors to the bus bar. The bonding conductor between the TBB and the TGB should be continuous and run

in the most direct path possible.

Often, the TGB is installed to the side of the panel board. When the building's structural steel is effectively grounded, each TGB should be bonded to the steel within the same room with a No. 6 AWG conductor. Always use the shortest distance possible in the grounding system.

## **The complete grounding and bonding system**

Ultimately, effective telecommunications system grounding and bonding means creating a continuous system in which each TGB is interconnected in a loop that begins and ends with the TMGB. A well-designed system is essential to protect equipment and personnel from harm. Also, using quality ground and bonding products will ensure the long-term success of the system.

Although the basic principles of grounding and bonding apply to telecommunications systems, the electrical contractor must understand the new terminology and unique grounding needs that these sensitive systems require. By planning ahead, today's telecommunications networks can work effectively and safely well into the future.