TIA-607-C, Rack & Cabinet Ground Bonding Solutions for Telecommunications Equipment

Telecommunications equipment is sensitive to electrical disturbances. While minimum grounding requirements within the power distribution system are designed for personal safety and fire prevention purposes, data center downtime and damage to equipment as a result of inadequate grounding can cost an organization millions of dollars.

Proper grounding is the most important factor in reliable network equipment performance. According to the IEEE, power distribution grounding is almost never sufficient to prevent damage to network equipment.

In a data center, electrical disturbances introduced on data cables, when not properly dissipated through a signal reference grid, can result in faulty data signals, lost data and network inefficiencies.

Electrical Disturbances (Noise)
Electrical equipment's power supply units are not designed to withstand significant changes in power caused by sags, spikes or surges. These and other electrical disturbances can affect or even damage sensitive electrical equipment.

Electromagnetic interference (**EMI)** affects an electrical circuit due to either electromagnetic induction or electromagnetic radiation emitted from an external source. The disturbance may interrupt, obstruct, or otherwise degrade or limit the effective performance of the circuit. These effects can range from a simple degradation to a total loss of data.

Electrostatic discharge (ESD) or static electricity is the sudden flow of electricity between two electrically charged objects caused by contact, an electrical short or dielectric breakdown, and can be extremely damaging to electronic components. A signal reference grid can be used to effectively dissipate electrostatic discharge.

Types of Electrical Disturbances (Noise)
The grounding of electrical equipment, and metallic equipment within a data center to a signal reference grid can help protect sensitive electrical equipment protect data transmissions from electrical disturbances (noise) as a result of electromagnetic interference, radio frequency interference, electrostatic discharge, cross talk, spikes, sags and surges in voltage.

TIA 607-C states that a computer room should contain a supplementary bonding network grounded to the Secondary bonding busbar (SBB) or primary bonding busbar (SBB). Metallic components in need of bonding include racks, cabinets, ladders, surge protectors, cable trays, routers, switches and patch panels, each bonded to the SBB or PBB using a minimum size conductor of 6 AWG.

7.1.4 Cabinets and racks
Rack bonding busbars (RBBs) are recommended for cabinets and racks that need to support multiple Unit (equipment) bonding conductors (UBC). Cabinets, racks, and other enclosures in computer rooms shall not be bonded serially; each shall have their own dedicated bonding conductor to the mesh-bonding network (mesh-BN), primary bonding busbar (PBB), secondary bonding busbar (SBB), or telecommunications equipment bonding conductor (TEBC).

7.1.5 Metallic pathways
In order to limit the potential difference between telecommunications pathways or between telecommunications pathways and power pathways, all metallic telecommunications pathways shall be bonded to the PBB or SBB. Additionally, to achieve the objective of potential equalization, ensure that cable ladders, cable runways, conduit, pipes and building steel are bonded together and bonded to the PBB or SBB.

7.4 Rack bonding busbar (RBB)
The RBB shall be installed horizontally or vertically on the rack using insulators which provide a minimum of 19mm or (0.75 in) separation.

7.4.2 Bonds to the RBB
The RBB shall be bonded to either the rack bonding conductor or to the telecommunications equipment bonding conductor and to the rack.

7.4.3 Connections to the RBB
Connections to the RBB shall utilize exothermic welding, listed compression two-hole lugs, or listed exothermic two-hole lugs.

7.5.8 Telecommunications equipment bonding conductors (TEBC)
The TEBC connects the PBB/SBB to equipment racks/cabinets. Connections to the TEBC shall be made with listed irreversible compression connectors.

7.6 Bonding equipment cabinets/equipment racks to the TEBC
The TEBC shall be connected to the cabinets/equipment racks, to an rack bonding conductors (RBC) or to a vertical/horizontal rack bonding busbar (RBB), utilizing properly sized listed two-hole compression lugs or listed terminal blocks with two internal hex screws.

7.7 Structural bonding of racks/cabinets
All detachable, metallic parts of equipment cabinets (e.g. frame, door, side panel, top panel) shall be connected to ground, either directly by means of grounding/bonding jumpers or through the cabinet frame, to the connection point on the cabinet where the cabinet bonding conductor connects to the cabinet. Removal of the paint from all bonding contact areas is recommended.