**27 05 26 BDF/IDF Grounding and Bonding for Communication Systems**

(Revision date: 10/12/11)

**1.0 Purpose**

1. These guidelines provide requirements for designers to incorporate into bid documents. They are part of the University Wiring Standard (UWS), version 3.0.
2. **General Requirements**
3. Overview. A bonding and grounding system supplemental to the electrical power grounding system and devoted to the communications system infrastructure is required in each campus building. Its purpose is to protect personnel and equipment from unwanted electrical currents associated with the communications infrastructure and equipment.

**3.0 Materials and Standards**

1. Materials. The materials used for this system are to be manufacturer and part number specific with no substitutions, unless specified as accepting “or equal.” See Section 27 06 00 Schedules for Communications Systems for a list of materials acceptable for use in NC State University projects.
2. Construction details. A detail drawing describing typical the typical bonding and grounding scheme to use in BDF/IDFs is available for download and modification by designers at the NCSU ComTech website.
3. Standards. All work shall be in accordance with the latest versions of the BICSI TDMM manual and TIA-607 standard, and with manufacturer’s recommendations. All work shall comply with all applicable NFPA and NEC requirements.
4. System components. The communications grounding system within a building will consist of the following components.
5. Bonding Conductor for Telecommunications (BCT). This conductor bonds the communications grounding system to the main electrical service (power) grounding system. It originates in the BDF and terminates at the electrical service ground for the building. It should be installed and terminated by the electrical contractor. The BCT shall be a continuous copper conductor sized according to length. This conductor shall be run in EMT conduit from the BDF directly to the main electrical room and bonded to main electrical ground (not to steel or water pipes). The size of the BCT should be based on the following table:

|  |  |
| --- | --- |
| BCT Length (LF) | BCT Size (AWG) |
| Less than 13  | 6  |
| 14-20  | 4  |
| 21-26  | 3  |
| 27-33  | 2  |
| 34-41  | 1  |
| 42-52  | 1/0  |
| 53-66  | 2/0  |
| Greater than 66  | 3/0  |

1. Telecommunications Main Grounding Busbar (TMGB). This bar is located in the BDF and serves as the hub for the communications grounding system in the entire building. It should be installed onto the wall mounted plywood at 24” AFF. The bar should be electrically insulated from its mounting hardware.
2. Telecommunications Grounding Busbar (TGB). This bar is located in each IDF and serves as the hub for the communications grounding system for that room. It should be installed onto the wall mounted plywood at 24” AFF. The bar should be electrically insulated from its mounting hardware.

1. Telecommunications Bonding Backbone (TBB). This conductor bonds the TGB in all IDFs back to the TMGB in the BDF. It should be routed inside the riser conduit system along side the telecommunications riser cables. The TBB will be insulated and will be installed without splices. It shall be run continuously from the TMGB to the TGB in the IDF farthest from the BDF. For buildings with multiple “stacks” of IDFs, additional TBB runs may be necessary.

TBB installation. The TBB should be sized per the table below with the TBB length calculated from the last TGB in the run to the TMGB. At each intermediate TGB, compression H-Tap type connectors should be used to bond the TBB to the jumper wire (#6) routed to the TGB.

|  |  |
| --- | --- |
| TBB Length (LF) | TBB Size (AWG) |
| Less than 13  | 6  |
| 14-20  | 4  |
| 21-26  | 3  |
| 27-33  | 2  |
| 34-41  | 1  |
| 42-52  | 1/0  |
| 53-66  | 2/0  |
| Greater than 66  | 3/0  |

1. Grounding Equalizer (GE). When more than one TBB is installed in a building (for IDFs in multiple stacks, an additional grounding equalizer conductor is required. This conductor connects the TGB’s in IDFs on the same floor in a building on the first, top and every intermediate third floor in multi-story buildings. These shall be routed on one floor, either via the riser cabling conduits or a separate conduit. Sizing for the GE is the same as for the TBB (using the table above).
2. Equipment racks. A #6, insulated grounding conductor shall be installed between the TMGB or TGB and all equipment racks. These should be connected in series using one continuous conductor. One lay-in lug should be installed onto the back of one of the side rails (at 9” below the top of rack) with the conductor insulation trimmed back across the lug setscrews. This conductor should be neatly fastened to the underside of the horizontal ladder rack.
3. Ladder racks. A #6, insulated grounding conductor shall be installed between the TMGB TGB and each contiguous group of ladder rack sections. This conductor should be bonded to the ladder rack with Flextray ground bolts. Adjacent sections of ladder rack should be bonded together with washer splice kits.
4. Pathway components. A #6 grounding conductor shall be installed from each distinct wireway or conduit over 1” in diameter which exits the BDF/IDF (and houses either horizontal or riser cabling) back to the TMGB/TGB. These conductors may be connected in series to provide a continuous connection to all components. Grounding lugs should be used for bonding to wireway ends. Grounding bushings or grounding clamps should be used for bonding to conduit ends. Adjacent wireway and conduit sections are not required to be bonded together with external bonding systems throughout the building distribution system.
5. Surface Mounted Cabinets. A TBB (sized #6) conductor shall be installed from a lay-in lug mounted on the inside of the rear section of the cabinet to the TMGB via the riser cable conduit.
6. Flush Mounted Cabinets. A TBB (sized #6) conductor shall be installed via the riser conduit system from the TMGB to each set of flush mounted cabinets. One lay-in lug will be mounted on the inside (right side) of each cabinet with the TBB connecting the cabinets in series.
7. General practices. The following general practices should be employed in the installation of bonding and grounding systems.
8. Support. The grounding conductors may be wall mounted or fastened to ladder racks with plastic cable ties. While they may be routed adjacent to telecommunications cables, they should not be attached to them in any way.
9. Substitute TBBs. Building steel, water pipes, or metallic conduits shall not serve as a substitute for the TBB.
10. Bonding of painted surfaces. An acceptable bond between the grounding conductor and painted metal surfaces is required. In these cases, a small area of the paint should be removed by prior to (but visible after) the installation of the ground lug. Zinc based antioxidant should be applied to the surfaces prior to installation of the lug.
11. Multiple IDFs. Stacked IDFs may be connected by TBBs in series.
12. Secondary bonding. The TMGB or TGBs will not be bonded to building steel, water pipes, etc. within the BDF or IDFs.
13. Grounding lugs. All lugs shall be two-hole type with both bolts installed. Compression lugs shall be crimped a minimum of two times for each.
14. Bar preparation. The mounting surfaces of the TMGB and TBBs should be cleaned with an abrasive pad. A copper based antioxidant (included in the bar kit) should be applied prior to installation of mounting lugs.
15. Insulation. All grounding conductors shall have a green plastic insulating sheath.