SECTION 270526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 SUMMARY
A. This section outlines the requirements of the telecommunication grounding work.

1.2 RELATED DOCUMENTS
A. Division 16 shall apply to work of this section.
B. Division 16 grounding shall apply in conjunction with this section, for a complete system.

1.3 DEFINITIONS
A. Manufacturers: Firms regularly engaged in the manufacture of electrical connectors, terminals and fittings, of types and ratings required, and ancillary grounding materials including stranded cable, copper braid and bus, ground rods and plate electrodes, whose products have been in satisfactory use in similar service for not less than three years.
B. NEC Compliance: Comply with NEC requirements as applicable to materials and installation of data/telecommunication grounding systems, associated equipment and wiring. Provide grounding products which are UL listed and labeled.
C. UL Compliance: Comply with applicable requirements of UL Standard Numbers 467 and 869, pertaining to data/telecommunication grounding and bonding.
D. TIA/EIA Compliance: Comply with TIA/EIA-607 Standards and the BICSI Telecommunications Distribution Methods Manual (TDMM) for the installation of data/telecommunication grounding and bonding systems.

1.4 SUBMITTALS
A. Submit all shop drawings and data in accordance with Division 1.
B. Provide submittal for Ground Bus Bar.
C. Provide submittal for #6 Ground/Bond Wire and Connectors.

PART 2 PRODUCTS

2.1 TELECOMMUNICATION GROUNDING SYSTEM
A. Provide a low impedance telecommunication grounding system with a stable ±0 volt to ground signal reference point for communication system equipment and infrastructures.

B. Telecommunication bonding backbone (TBB) shall be sized per NEC Table 250-66 (based on largest service entrance conductor or equivalent area for parallel conductors), minimum of a #2 AWG copper conductor.
C. All bonding conductors shall be minimum #6 AWG, insulated (green jacket), stranded copper.

D. In multi-story buildings requiring two or more vertical TBB's, the TBB's shall be bonded together at the top and bottom floors, with a minimum of every third floor when the building exceeds four floors.

E. System connections shall be irreversible compression-type connectors or exothermic welding with bronze bolt, star washer and nut connection hardware.

F. Zinc-clad or nickel-plated steel hardware is not acceptable.

G. Set screw, box lug, and split-bolt connectors are not acceptable.

H. Where required by local code, the data/telecommunication grounding system backbone cable conductor shall be a bare stranded copper conductor in lieu of an insulated conductor when installed in open cable trays and/or exposed in a return air plenum space or riser rated space. The Contractor shall verify requirements and coordinate with the Engineer.

I. Two-hole compression lugs shall be utilized for backbone cable terminations of #2 AWG and larger. One-hole compression lugs may be utilized for cable terminations of #6 AWG up to #2 AWG.

PART 3 EXECUTION

3.1 INSTALLATION

A. Bonding and grounding conductors installed in ferrous metallic conduit shall be bonded at each end of conduit, utilizing a minimum #6 AWG copper conductor and bond bushings. Conduits less than 3'-0" in length shall be bonded at one end. Bond bushing lug shall be replaced with a compression-type ground lug, bolted to bushing with bronze machine screw and star washer.

B. Bonding and grounding conductor splices shall be kept to a minimum. All splices shall be located in the telecommunication spaces only and shall be fully accessible.

C. Bonding conductors shall be individually routed to each piece of equipment.

D. Conductors shall terminate onto dedicated grounding lugs, one conductor per termination.

E. All conductors shall be maintained as short and as straight as possible.

F. Conductors shall be free from loops and coils; no bend shall be greater than 90 degrees.

G. The data/telecommunication grounding system shall be extended to and through data/communication raceways such as cable trays, cable channels, ladder systems, metallic surface-mounted raceways, etc., by means of extending a #6 AWG minimum bonding conductor through the length of the raceway system and bonding to each section of raceway, lugging at 10 foot maximum intervals along the length of the raceway, and
lugging to any section of raceway greater than 3 feet in length, in lieu of the installation of individual bonding jumpers between each raceway section.

H. Where a bare copper TBB conductor or bonding conductor is routed through a cable tray system, the conductor shall be tied down and anchored to the cable tray, 36" maximum on center, utilizing a UL listed wire fastener as required.

I. The data/telecommunication grounding system shall meet the requirements of NEC Articles 250 and 800. The Contractor shall bond individual electronic components and equipment to the grounding system per the equipment manufacturer's recommendations and instructions.

J. Each telecommunication bonding conductor shall be labeled. Labels shall be located on conductors, as close as practicable to their point of termination. Label shall be non-metallic and include the following information: "WARNING - IF THIS CONNECTOR OR CABLE IS LOOSE OR MUST BE REMOVED, PLEASE CALL THE BUILDING TELECOMMUNICATION MANAGER."

K. Items to be bonded to the data/telecommunication grounding system at the ground distribution bus bars shall include, but not be limited to, the following:

1. Telephone equipment (e.g. PBX's, KSU's, ISDN equipment, etc.).
2. CATV equipment.
3. Equipment racks and cabinets.
4. Cable ladders, trays, and channels.
5. Surface-mounted metallic raceways and wireways.
6. Metallic conduit systems.
7. Service entrance protected terminals.
8. Telecommunications and fiber-optic splice enclosures.
9. Inter-building cable sheaths and messengers.
10. Coupled bonding conductors.
11. Paging and access control systems.

3.2 SYSTEM TESTING

A. Upon completion of the installation of the data/telecommunication grounding system and/or servicing of the existing grounding systems, the Contractor shall perform approved standard ground resistance tests with an Engineer-approved ground resistance test unit (i.e., stakeless clamp-on ground resistance tester, three-point fall of potential tester), using approved procedures as noted in this specification.

B. The Contractor shall perform telecommunication grounding system testing as follows:

1. Measure ground current and ground resistance readings on all TBB conductors at each telecommunications main grounding bus bar.
2. Measure ground current and ground resistance readings on all bonding jumpers at each telecommunications main grounding bus bar.
3. Record all readings in a Test Report.
4. Where test results indicate a ground current of 1 amp or greater, the Contractor shall take appropriate action to identify and reduce the ground current to less than 1 amp. The Contractor shall notify the Engineer in writing of the excessive ground current, the source, and the action taken to reduce the current.
C. The Contractor shall demonstrate to the Owner or Owner’s representative, by testing, that the data/telecommunication ground system to earth resistance value is 5 ohms or less, utilizing a “clamp-on” or three-point fall of potential tester.

D. The Contractor shall be able to demonstrate to the Owner or Owner’s representative, by test, that the data/telecommunication grounding system resistance from any grounded non-current-carrying conductor in the system to the electrical service entrance neutral/ground bonding conductor is less than 0.1 ohms.

E. The Contractor shall record the test results in a Test Report, and provide a description of the testing procedures for submission to the Engineer for approval.

F. The Contractor shall include copies of the completed and approved Test Report in the Instruction Manuals.

END OF SECTION 270526