

**SECTION 16170**  
**GROUNDING AND BONDING**

A. Medium Voltage Distribution System

The following medium voltage distribution systems are present on the Indiana University Campuses:

1. IU Bloomington: 4160 volt and 12,470 volt
2. IU Purdue University Indianapolis: 13,800 volt
3. IU Northwest: 12,470 volt
4. IU South Bend: 12,470 volt

In general, all systems are solidly grounded; verify system configuration at Campus locations. Distribution consists of phase conductors plus an insulated ground cable. This ground cable should be a 600 volt THW insulated cable. The existing system ground while not perfect is one of the best grounds available. This system ground should be extended to ground buses in the medium voltage switchgear and bonded to the other grounding electrodes used in the building. The size of the system ground cable shall be as recommended by Engineering Services or CFS.

B. Service Entrance

1. Simply referring to the National Electrical Code Article 250 on Grounding is not acceptable. The NEC is not a design manual and while we must meet the requirements of the NEC, additional information on the installation of the grounding system is the responsibility of the consulting engineer. The installation of ground mats, connection to water service, building steel, footing grounds, etc., should be shown on the drawings and included in specifications.
2. Grounding Electrode:
  - a. Utilize building steel where available
  - b. Metal underground piping shall be used (natural gas piping shall not be used)
  - c. A building footing ground shall be installed per NEC Article 250.52(A)(3)
  - d. A ground mat consisting of at least three driven ground rods (8'-0" X 3/4" copper clad steel) 10 foot on center shall be installed.
3. The maximum acceptable impedance to ground at the service entrance is 5 ohms and the grounding system should be designed accordingly. The project specifications shall require testing and documentation of this ground impedance. Test results shall be included in record documents.
4. Grounding electrode systems shall be bonded together at the service entrance within the main switchgear enclosure(s). No independent grounding electrode systems are allowed.

C. Feeders

Feeders shall have a separate insulated equipment grounding conductor installed.

D. Branch Circuits

Receptacle, lighting, power utilization equipment, etc., shall have separate insulated equipment ground conductors installed.

E. Telecommunication System

The telecommunication systems installed shall be grounded in accordance with the latest version of the IU Technical Standards for Telecommunications Distribution Facilities.

F. Terminations

Terminations of grounding system conductors shall be done using listed lugs and fittings specifically made for the use intended. Using sheet metal bolts with lock washers and Sta-Con connections on the wire is not acceptable.

G. Inspection

The consulting engineer and owner's representative should inspect the main distribution equipment to verify that the main bonding jumper between the system ground and the grounded conductor (neutral in most cases) has been installed. Engineering Services has found several installations where this jumper was not properly installed resulting in an unsafe working condition.

H. Manholes

All metal parts in manholes (i.e. lids, rings, frames and supports) shall be bonded to ground rod and ductbank ground conductor with a minimum #6 THW conductor.

I. Ductbanks

Refer to Electrical Standard 16110 for ground conductor requirements in ductbanks.