

SECTION 16450

GROUNDING

Part 1 -Design Directives

The grounding system for each building shall be detailed on the design drawings and not left to the electrical contractor to specify. The drawings shall show the size and type of conductor and raceway to be used to ground the main building feeder and every separately derived system within the facility. The location and type of grounding electrodes shall be clearly identified.

The following grounding electrodes must be connected to and utilized when available at the building under construction:

Metal underground water pipe in contact with the earth for 10 feet or more
Metal frame of building that is effectively grounded
Concrete encased electrodes
Ground ring

The metal frame of the building may only be considered as a grounding electrode when one of the following conditions are met:

The building steel is bonded to reinforcing steel in the foundation and in the footing under the foundation.

OR

The building steel is connected to a conductor that rings the entire foundation of the building and a point of attachment is made at two vertical steel members at each of the exterior walls of the building. The ring conductor shall be a minimum of 4/0 bare copper buried to a depth of at least 4 feet below grade. The connections from the ring to the building steel shall be 4/0 copper and exothermically welded at the point of attachment to the ring and the building.

The supplementary grounding electrode shall consist of counterpoise made up as detailed below:

Counterpoise with three 10 foot by 3/4 inch copper clad steel rods driven in the pattern of an equilateral triangle with sides of 8 feet. The grounding electrode conductor shall be attached to each rod in the counterpoise by exothermic welding or hydraulic crimp. A loop of wire that originates and ends inside the building shall make up the grounding electrode conductor from the counterpoise. This assembly shall be tested using a remote earth test set to verify an impedance of 25 ohms or less.

The grounding system to be used in all facilities at Dartmouth shall be configured as follows:

A grounding bus bar shall be constructed inside the main electric vault where the building receives power from the medium voltage distribution system. The grounding bus shall be 2 inch by 1/4 inch hard drawn copper bar. It shall be attached to the wall at 30 inches above the floor with standoff insulators spaced 18 inches apart over the entire length of the bar. The bar shall be located behind the high voltage loop switches and extend at least the entire length of two walls inside the room so that it is accessible for connections. Grounding electrodes as available within the facility will be connected to this bar using compression connections or exothermic welding. All grounding electrode conductors from each separately derived system shall be connected to this grounding bus regardless of their location in the building.

At each separately derived system the bonding jumper and grounding electrode conductor connection shall be located within the same device. In the case of a unitized secondary substation the connection shall be in the switchboard section just before the main breaker. Where individual transformers (less than 300 KVA) and an associated switchboard or panelboard is used the connection shall be made in the transformer enclosure.

Emergency generators configured as separately derived systems shall have their grounding and bonding connection either at the generator output terminals or in the main overcurrent device enclosure wherever most practical. Generator frames shall be bonded to the grounding electrode system.

The electrical contractor shall be instructed to obtain a quotation from a certified design and installation firm for a UL master labeled lightning protection system to be included as an add-alternate to the electrical subcontract price.

Part 2 -Products

No designated manufacturers

Part 3 -Execution

The standards that govern raceways and conductors shall apply to the workmanship issues associated with grounding systems.