

General:

All wiring and entrance equipment for two wire 120 Volt, three wire 120/240 Volt, four wire 120/208 Volt, and four wire 277/480 Volt shall be designed and installed in a manner suitable for operation with ground connections.

Wiring and entrance equipment for two wire 240 Volt single phase and 3 wire 240 Volt three phase, shall be designed and installed for operation with conductors ungrounded, unless it is definitely known that one of the conductors is grounded. The box, cabinet and/or meter socket shall be grounded.

Service conductor for 480 Volt, three wire, three phase service connections are not to be grounded. The box or cabinet shall be grounded.

The grounded conductor and equipment of the service entrance shall be effectively and permanently grounded in accordance with or better than the latest edition of the NEC (National Electrical Code) or in accordance with the requirements of applicable authorities having jurisdiction where any differences occur. Aluminum wire shall not be used as a ground wire where in direct contact with masonry or the earth or where subject to corrosive conditions when terminating copper and aluminum conductors at the same point an inhibitor shall be used.

Approved Grounding Electrode System:

The following are examples of approved grounding systems.

1. A metal underground water pipe in direct contact with the earth for ten feet or more (including any metal well casing effectively bonded to the pipe) in addition to a supplemental ground rod (minimum acceptable ground rod shall be 1/2 inch copper, driven to a depth of eight (8) feet).
2. A single driven ground rod with a resistance to ground of 25 ohms or less or two driven ground rods placed at a minimum of six (6) feet apart.
3. As outlined in the National Electrical Code - Latest Edition - Article 250.

Grounding Conductor:

The size of the grounding conductor on a grounded or ungrounded system, shall not be less than given in the following table.

GROUNDING

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Size of Grounding Conductor (per NEC)

Size of Largest Service Entrance Conductor or Equivalent for Parallel Conductors		Size of Copper Grounding Conductor AWG No.
Copper	Aluminum or Copper Clad Aluminum	
2 or smaller	0 or smaller	8
1 or 1/0	2/0 or 3/0	6
2/0 or 3/0	4/0 or 250 MCM	4
over 3/0 to 350 MCM	over 250 to 500 MCM	2
over 350 MCM to 600 MCM	over 500 to 900 MCM	1/0
over 600 MCM to 1,100 MCM	over 900 to 1750 MCM	2/0
over 1,100 MCM	over 1750 MCM	3/0

➤ **Made Electrode:**

The size of the artificial ground shall not be less than 1/2 inch copper, the length shall not be less than 8 feet. The ground rod shall be driven to a depth to leave the ground clamp exposed for visual inspection.

Made Electrode Grounding Conductor:

The size of the grounding conductor on a grounded or ungrounded system, when connected to an artificial or made ground, shall not be less than is given in the following table.

Size of Largest Service Entrance Conductor or Equivalent for Parallel Conductors		Size of Copper Grounding Conductor AWG No.
Copper	Aluminum or Copper Clad Aluminum	
2 or smaller	0 or smaller	8
1 or larger	2/0 or larger	6

Installation:

When a No. 6 or larger grounding conductor is connected to a grounding system or an artificial or made ground and where the grounding conductor is exposed to physical damage, rigid metal conduit, intermediate metal conduit, electrical metallic tubing, or cable armor shall be used to protect the ground wire. Grounding conductors smaller than No. 6 shall be in rigid metal conduit, intermediate metal conduit, electrical metallic tubing or cable armor. Metal enclosures shall be electrically continuous.

Entrance Equipment:

The grounding conductor shall be connected to the neutral conductor (or to the grounded phase conductor of a 3-wire delta service) on the line side of the main service disconnecting means or on the line side of the first service disconnecting means.

Bonding:

The non-current-carrying metal parts of the entrance equipment shall be effectively bonded per the NEC. This equipment includes meter sockets, meter connection boxes, and instrument transformer cabinets.

Metal water piping and other metal piping shall be bonded in accordance with NEC. Gas piping within a building shall not be used as a grounding electrode but shall be bonded in accordance with the NEC on the customer's side of the gas meter.

Connectors:

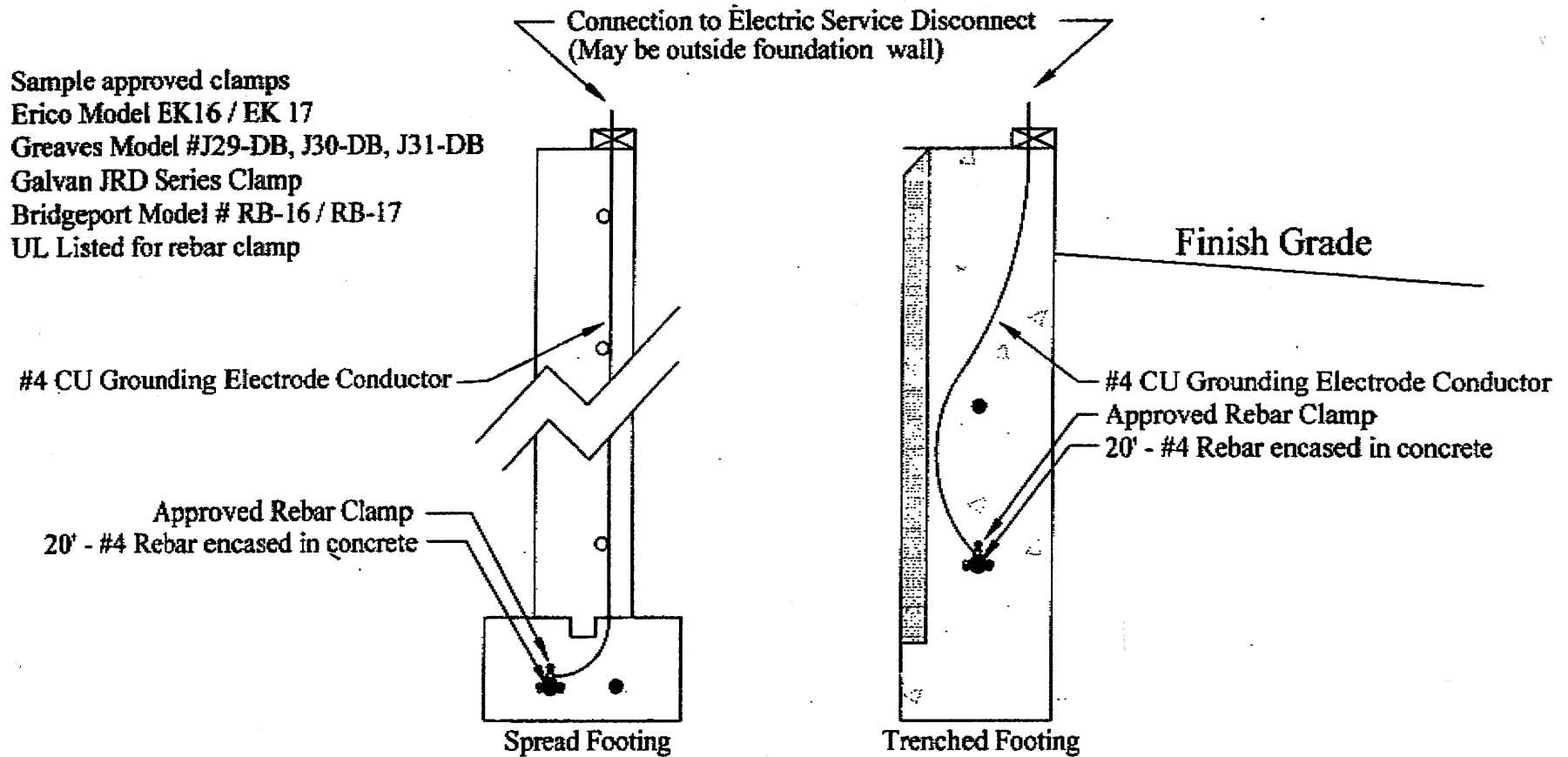
The grounding conductor shall be connected to the grounding electrode system and made electrode by suitable lugs, pressure connectors, clamps, or other approved means. Connections depending on solder shall not be used. Ground Clamps shall be suitable for the materials of the grounding electrode and the grounding electrode conductor.

When a cast bronze, brass or galvanized iron fitting is used, it should be designed so that the end of the conduit or armor enclosing the grounding conductor will be bonded to the fitting. Bolts, screws or terminals used for connecting the grounding conductor to the ground clamp shall be the correct size to fit the grounding conductor being used.

All ground connections and bonding shall be made by a UL approved ground clamp, solderless copper lug, or fitting.

CONCRETE ENCASED ELECTRODE

Article 250.50 of the Indiana Electrical Code (National Electrical Code, 2005 Edition) requires that all grounding electrodes that are present at each building shall be bonded together to form the grounding system.



Alternate Concrete Encased Electrode - 20' of bare copper conductor not smaller than #4 AWG placed in the bottom 1/3 of the concrete footing and covered by at least 2" of concrete.

Effective enforcement date: 04/01/06

All new construction projects will be required to provide the concrete encased electrode connection when #4 reinforcing bar or larger is provided in the foundation system. When a concrete encased electrode is used, grounding rods will no longer be required.