

## **REINFORCING BARS EMBEDDED IN CONCRETE “Ufer Ground”**

### **2017 National Electrical Code (NEC) 250.50 & Wisconsin Chapter SPS 316**

Q: Do we have to install re-bar in the concrete footing to ground the Electrical Service?

A: No, unless it is in the Specs or if the Builder, Owner or Electrician want it installed.(a)

Q: If we do install steel re-bar does it need to be Grounded to the Electrical Service?

A: Yes, if it at least 20’ long and embedded in the concrete footing or wall.(b),(c) \*\*

Electrical Services are typically Grounded with two 8’ Ground Rods that are driven into the ground near the electric service and are at least 6’ apart per SPS 316.250. If a Ufer Ground is used then ground rods are not needed (*per electrical code*).

NEC 250.50 **requires** bonding the grounding electrode system to reinforcing bars that are embedded in concrete footings and/or concrete foundation walls. (a)The NEC (SPS 316) does **not** require reinforcing bars to be installed in concrete if they are **not** needed per the approved building plans. (b)If **steel** reinforcing bars **are** used at combined lengths of at least 20’ in a footing or wall, they **must** be bonded to the electrical service. Only *one* section (area) of reinforcing bar(s) needs to be bonded if several areas of re-bar are used in the building. This requirement typically applies to re-bar that is installed in footings and foundations in direct contact with the ground. (c)Reinforcing bars installed in foundation walls that are **insulated** or **waterproofed** on the exterior and are not backfilled on the interior do **not** require bonding as the wall is considered not in direct contact with the earth.

NEC 250.52(3) describes a “Concrete-Encased Electrode (*Ufer Ground*)” as a minimum of a 20’ x ½” or larger re-bar embedded in at least 2” of concrete on all sides. At least a 20’ length embedded in concrete that is in direct contact with the earth; such as a footing. *Note: a 20’ re-bar bent up 6” out of a footing no longer has 20’ embedded in the concrete footing.* Re-bars may be connected together by steel wire ties or other approved methods to achieve at least 20’ length embedded in the concrete. This is then bonded to the Electrical Service with a minimum of #4 AWG copper wire.

The re-bar can be stubbed up out of the footing/ foundation near where the electrical service or sub-panel will be installed **or** a ground wire attached directly to the re-bar in the concrete with an approved clamp prior to pouring concrete. The re-bar stub does not need to extend above a basement floor if connectors approved for direct burial are used to connect the ground wire. The re-bar cannot extend through or terminate in fill, dirt, clay, gravel, etc.

This would also apply to outbuildings, sheds & garages where reinforcing bar is used in the footing, thickened perimeter slab or foundation and that will have a 30A or greater service of feeder. This would not apply to an outbuilding that is fed by only a 15A or 20A single or multi-wire branch circuit per Nec 250.32.

If a Concrete-Encased Electrode (*Ufer Ground*) is installed and bonded per Nec 250.52(3), no other electrodes (ground rods) are required. The Concrete-Encased Electrode may be the single Grounding Electrode. Metal water service lateral, metal water and gas piping shall be bonded per code.

*\*\*Does not apply to epoxy coated steel or fiberglass re-bar.*