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## BULLETIN 02-2

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Subject: Availability of Concrete-Encased Electrodes

Reference: N.J.A.C. 5:23-3.4 and N.J.A.C. 5:23-3.16, Electrical Subcode, Section 250.52(A)(3)

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Section 250.50 of the Electrical Subcode requires formation of a grounding electrode system by bonding together each item listed that is present on the premises. A conductive reinforcing bar (rebar), measuring at least ½ inch in diameter and 20 feet in length that is encased in not less than 2 inches of concrete, is one of the electrodes listed in Section 250.52(A)(3). Studies suggest that a concrete-encased electrode is one of the most reliable and effective electrodes, even in adverse climates and soil conditions. However, it is not being utilized uniformly in the State of New Jersey because of misunderstanding, lack of planning, and difficulties encountered in enforcement.

When the footing of a structure is designed using uncoated, conductive steel rebars measuring ½ inch or more in diameter and 20 or more feet in length, the rebars are present. They are required to be bonded to the grounding electrode system in new construction if they are designed to be encased in not less than 2 inches of concrete. This is not difficult to achieve provided that (1) a construction permit under the Building Subcode is issued for the connection to the rebar prior to its installation, and (2) construction activities are planned and coordinated properly. This requirement, however, does not apply where the electrical work is performed in an existing structure.

The Department of Community Affairs has assigned the building subcode official/inspector responsibility for the inspection of bonding connections to the rebars. This can be accomplished during inspection of the footings before the concrete is poured. As outlined in the Electrical Subcode, Section 250.70, this involves inspecting a listed clamp that connects the rebar of a specified size, which is located at the bottom of the footing and will remain in direct contact with the earth, to a solid or stranded copper conductor of size 4 AWG, as specified in the Electrical Subcode, Section 250.66(B). The 20 feet of rebar can be one continuous piece, or many pieces tied together by tie wires to form a continuous length of 20 feet or more. A concrete-encased electrode can also be a 4 AWG bare copper conductor at least 20 feet long that is encased in 2 inches of concrete in or near the footing. Field inspection of this installation by a building inspector does not require any specialized training.

Building subcode officials are required to ensure that conductive steel rebars used in the footings of a new structure that measure ½ inch or more in diameter are properly bonded and inspected as above. This will enhance the effectiveness of the grounding system at a minimal cost. The reliability and effectiveness of the grounding system is vital for sensitive electrical, communications, and information technology equipment.

*Note: Additions that will utilize rebar as described above (i.e., size, length) are required to be used as concrete-encased electrodes only when the existing service is being relocated to the addition, or a new service is being installed on/in the addition.*