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BULLETIN NO.
99-1
BULLETIN

Date: **April 1999**
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Subject: **Periodic Electrical Inspections, and "Bonding and Grounding" Certificates for Swimming Pools, Spas, and Hot Tubs**

Reference: **N.J.A.C. 5:23-2.18C and 2.20(e)**

Introduction

P.L. 1998, c. 137, which supplements the State Uniform Construction Code (UCC) Act, provides for periodic electrical inspections and testing of swimming pools, spas, and hot tubs, with the exception of those associated with a one- or two-family dwelling. Pools, spas, and hot tubs are required to have a "bonding and grounding" certificate issued by a recognized electrical testing agency or licensed electrical contractor, and an Electrical Certificate of Compliance issued by the enforcing agency upon satisfactory completion of a visual inspection.

Bonding and Grounding Tests and Certificate

The testing agency or licensed electrical contractor performing the tests is the responsible agency for determining the acceptability of the continuity and integrity of the bonding and grounding system. Before the issuance of a bonding and grounding certificate, the testing agency or licensed electrical contractor performs tests to evaluate the electrical bonding and grounding system, in accordance with the Electrical Subcode. At a minimum, the certification should include the name and address of the firm performing the testing; the location of the pool, spa, or hot tub; and the date(s) when the testing was performed. The certificate should clearly include the following or a similar statement: "The continuity and integrity of the bonding and grounding system of the [pool/spa/hot tub] have been tested, and have been found to be acceptable in accordance with the applicable requirements of the Electrical Subcode of the UCC."

The tests performed for the certification should be of a nondestructive type, and conducted with properly calibrated instruments that have appropriate sensitivity levels to obtain valid and reliable results. These tests, by their nature, describe the existing conditions of a bonding and grounding system. It is not intended for the testing agency to issue a certification that extends for the full five years. Unless otherwise determined by the electrical subcode official, the bonding and grounding

certificate shall remain valid for a period of five years from the date of issuance as expressed in the Act.

Any test result indicating a potentially unsafe electrical condition shall immediately be followed by appropriate safety actions, including the issuance of an unsafe structure notice if warranted, by the electrical subcode official and subsequent modifications or repairs. If it is discovered that there is no bonding between the conductive parts, then a construction permit under the UCC must be obtained and the pool, spa, or hot tub must be retrofitted to provide a bonding system. Some modifications to a deficient bonding and grounding system may require a construction permit and retesting. Additionally, retesting may be required if any modifications are made to the pool, spa, or hot tub that impact the bonding and grounding system.

If the electrical subcode official has questions about the validity of the certificate, the test information (such as type of tests conducted, actual readings and their interpretation, instruments used and their calibrations, test technicians and their expertise, etc.) should be reviewed and, if required, a report may be obtained, as outlined under N.J.A.C. 5:23-2.19, Special Technical Services.

Electrical Certificate of Compliance

The electrical subcode official/inspector performs a visual (nondestructive) inspection of the electrical equipment and wiring associated with each pool, spa, or hot tub to ensure that the installation is safe, and meets the applicable requirements of the Electrical Subcode. This inspection should address all visible safety items covered by the Electrical Subcode, such as the condition of connections and terminations, GFCI protection for motors (where required), receptacles and underwater lights, the location of receptacles and switches, the location and sealing of junction boxes and deck boxes, etc. Retrofitting may be necessary to correct any deficiencies found during this inspection. Variations may be granted where retrofitting is impossible and safety is not compromised.

The local code enforcement agency must have a copy of the valid bonding and grounding certificate before the issuance of an annual Electrical Certificate of Compliance for the pool, spa, or hot tub. For the first year, construction officials are advised to allow a reasonable time for compliance, and to use their discretion when assessing penalties for the continued use and occupancy of a pool, spa, or hot tub without a valid Electrical Certificate of Compliance.

Background

There are many reasons for grounding and bonding the electrical system, the most important of which are life safety and eliminating shock hazards. Improper bonding and grounding -- or the deterioration of connections and wiring caused by corrosion associated with wet conditions in and around a pool, spa, or hot tub -- may create shock hazards. These tests and inspections are meant to eliminate such potentially hazardous conditions which could be fatal if not detected and corrected.

BULLETIN NO.

99-1

BULLETIN

Bonding System

The intent of bonding is to provide a means to equalize the potential of all conductive surfaces and equipment so that there is no voltage gradient, and no current flow between conductive parts in and around the pool. Bonding reduces shock hazards created by stray currents present in the piping system and in the ground (external to the pool, and its electrical wiring and equipment). This is accomplished by connecting all metallic parts within five feet of the pool (e.g., ladder, diving board, fence) using a solid copper wire. This wire forms a conductive path which provides electrical continuity and the capacity to conduct safely any current likely to be imposed on it.

Grounding System

The intent of grounding is to provide an electrically continuous path that limits the voltage to ground during a fault and facilitates the flow of enough current to cause rapid opening of the circuit overcurrent protective device.

When a ground fault occurs, the grounding system furnishes a low-resistance path for the fault current to reach the circuit overcurrent protective device and cause the device to operate quickly, thereby limiting the time the fault exists. The size of the wire or conductor and the quality of the connections cause the resistance to be low, and the grounding system to function as intended. The higher the resistance or impedance, the lower the current passing through the grounding system in the event of a fault, the longer it takes for the overcurrent protective device to operate and clear the fault, and the longer the hazard exists to cause damage and/or death.

Grounding is accomplished by running a copper wire from the grounding terminal bar to the non-current carrying metallic portions of specified electrical equipment and enclosures (frames of motors, housing of lighting fixtures, etc.).

NOTE: The Electrical Subcode establishes 25 ohms as the maximum resistance-to-ground of a specific electrode. This is not meant to be the acceptable value for determining whether the grounding system has a path of sufficiently low impedance. If a fault clears promptly, it is extremely unlikely that any loss of life will occur. Therefore, testing of the bonding and grounding system should focus on the continuity and impedance of the path.