The NFPA places ALL liability on safety on the Local Authority Having Jurisdiction! This may come as a surprise to most people, but when the NFPA disclaimer is referenced, it is very clear.

If you are an Inspector, you may not realize that YOU have the authority to require the pool builders adhere to the 2005 version of the National Electrical Code, as is referenced in this Proposal form 2011, when Wayne H. Robinson, a former Chief Electrical Inspector, Author, Speaker, and Educator.

For simplicity, if the TIA proposal had been accepted and reverted back to the 2005 version, it would have read: (Note: **This is what you have the authority to require.)**

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*680.26(B)(2)*

**(2) Perimeter Surfaces.** The perimeter surface shall extend for 1 m (3 ft) horizontally beyond the inside walls of the pool and shall include unpaved surfaces as well as poured concrete and other types of paving. Bonding to perimeter surfaces shall be provided as specified in 680.26(B)(2)(a)or(2)(b)and shall be attached to the pool reinforcing steel or copper conductor grid at a minimum of four (4) points uniformly spaced around the perimeter of the pool. For nonconductive pool shells, bonding at four points shall not be required.

(a) *Structural Reinforcing Steel.* Structural reinforcing steel shall be bonded in accordance with 680.26(B)(1)(a).

(b) *Alternate Means.* Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper grid shall be utilized where the following requirements are met:

(1) The copper grid shall be constructed of 8 AWG bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).

(2) The copper grid shall follow the contour of the perimeter surface extending (3 ft) horizontally beyond the inside walls of the pool

(3) Only listed splices shall be permitted.

(4) Be secured within or under the deck or unpaved surfaces no more than 150-mm (4 in. to 6 in.) from the underside of the deck.

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Additionally the following experts and organizations support reverting back to this:

- IEEE Chair of the Stray Voltage Working Group
- The Senior Project Manager for EPRI(Electric Power Research Institute)
- Edison Electric Institute
- NEETRAC (National Electric Energy Testing, Research and Applications Center)
- The Electrical Section of the NFPA (almost unanimous except for CMP17)
- The NFPA Membership Body(almost unanimous except for CMP17)
- Minority of CMP17, ie., not a majority to vote the change

Below is the TIA (Tentative Interim Amendment) in full, as recorded:

**NFPA 70®-2008 Edition**

*National Electrical Code*®
**TIA Log No.:** 936
**Reference:** 680.26
**Comment Closing Date:** January 16, 2009
**Submitter:** Wayne H. Robinson, Lothian, MD

*1. Revise 680.26(B)(1)(b)(2) as follows:*

(2) Conform to the contour of the pool [~~and the pool deck~~] and the perimeter surfaces outlined in 680.26(B)(2)

*2. Revise 680.26(B)(2) as follows:*

**(2) Perimeter Surfaces.** The perimeter surface shall extend for 1 m (3 ft) horizontally beyond the inside walls of the pool and shall include unpaved surfaces as well as poured concrete and other types of paving. Bonding to perimeter surfaces shall be provided as specified in 680.26(B)(2)(a)or(2)(b)and shall be attached to the pool reinforcing steel or copper conductor grid at a minimum of four (4) points uniformly spaced around the perimeter of the pool. For nonconductive pool shells, bonding at four points shall not be required.

(a) *Structural Reinforcing Steel.* Structural reinforcing steel shall be bonded in accordance with 680.26(B)(1)(a).

(b) *Alternate Means.* Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper grid ~~conductor(s)~~ shall be utilized where the following requirements are met:
~~(1) At least one minimum 8 AWG bare solid copper conductor shall be provided.~~
~~(2) The conductors shall follow the contour of the perimeter surface.~~
(1) The copper grid shall be constructed of 8 AWG bare copper and be arranged meeting the requirements of 680.26(B)(1)(b)(3).
(2) The copper grid shall follow the contour of the perimeter surface extending (3 ft) horizontally beyond the inside walls of the pool
(3) ~~(3)~~ Only listed splices shall be permitted.
~~(4) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.~~
~~(5) The required conductor shall be secured within or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below the subgrade.]~~
(4) Be secured within or under the deck or unpaved surfaces no more than 150-mm (4 in. to 6 in.) from the underside of the deck.

**Substantiation:** 1. Comment 17-92, no substantiation or adequate test data was submitted to support a single conductor for perimeter surfaces outlined in 680.26(B)(2)(b). After requesting the pertinent test data from NFPA the only available test data for pools was from comment 17-98. This data only supported the new 2008, Section 680.26(C) not 680.26(B)(2)(b). The code change was proposed and implemented solely based on OPINION, not from actual test data, even though substantial test data for equipotential bonding grids was available for dairies.

2. Testing has now been conducted by A Research Center of the Georgia Institute of Technology, National Electric Energy Test Research & Application Center (NEETRAC) that unequivocally proves an equipotential bonding grid is required and a single wire will NOT always provide adequate protection!

3. The requirements in 680.26(B)(1)(b) conflicts with the requirements of 680.26(B)(2)(b). Code sections within an Article that conflict with one another will lead to misinterpretation and improper application of the applicable wiring method which ultimately will endanger the public. Rewording "Alternate Means" (single wire reference) from the 2008 Edition and replacing it with the 2005, 680.26(C)(3) Alternate Means, will remedy this error by installing a copper conductor grid.

4. 680.26(B)(1)(b)(2) requires the grid to contour to the pool and deck; however in the same instance 680.26(B)(2) requires the perimeter surface to extend 3' out, not to the complete contour of the deck. The result of this conflict will be misapplication, increased cost for pool construction and danger to the public.

Equipotential bonding grids are established by definition under 547.2 and 547.10 "Equipotential Plane, an area where wire mesh or other conductive elements are embedded in or placed under concrete, bonded to all metal structures and fixed non-electrical equipment that may become energized, and connected to the electrical grounding system to prevent a difference in voltage from developing within the plane". The equipotential bonding grid for dairies and agricultural buildings are based on solid testing documentation from the American Society of Agricultural and Biological Engineers (ASABE). Their self-help guide for Equipotential Planes for Stray Voltage Reduction requires a grid system, not a single conductor. It further identifies that 8 AWG copper is considered the minimum conductor size (see attached PDF). Further studies and data are available from the American Society of Agricultural Engineers (ASAE), 1998 International meeting revisiting the requirements of equipotential planes. One of the major issues outlined in this TIA is that we afford more protection for dairy cows than we do for humans in pool environments. Humans and dairy cows carry approximately the same resistance in body mass.

5. The proposed TIA intends to correct a circumstance where changes to 680.26(C), 2005 Edition were implemented without adequate technical (safety) justification to support the single conductor over a copper grid. In addition, it provides clarification regarding the grid and contour of the deck requirements.

**Emergency Nature:** Test data from NEETRAC refutes a single copper conductor application for decks, pavers, unpaved surfaces and supports an equipotential plane or copper grid system, as originally outlined in the 2005 Edition of the NEC. Supporting documentation from utilities in Georgia and Mississippi referencing stray-current problems on pool decks, along with conclusive testing conducted by NEETRAC, confirms the need for rewording a single conductor alternate means outlined in 680.26(B)(2)(b)(1), and replacing it with the copper conductor grid identified in 680.26(B)(1)(b). The test data from NEETRAC proves unequivocally that an equipotential copper bonding grid (ground mat) around a swimming pool can and will effectively mitigate the voltages over an alternate means (ground ring) described in 680.26(B)(2)(b)(1) of the 2008 NEC. A ground ring will work only when there is no evidence of stray current, but cannot protect the public where conditions of multiple grounded neutral systems and stray-current conditions prevail, which may happen at anytime. In addition the test data supports the studies for equipotential bonding grids in dairy barns and agricultural areas as referenced in Article 547 NEC. An order to provide minimum safety standards for the public in pool environments; I am compelled to respectfully submit this TIA.