

**Date: 6/30/2016**

**Issue: The Permanent Installation of Directly Connected Submersible Well Pumps in Bodies of Water.**

**Background:**

The 2016 Idaho Legislature enacted House Bill 643, and the Governor signed that bill on Tuesday, April 5, which changes the regulatory backdrop for the installation of submersible well pumps in lakes and other bodies of water in Idaho. A collaborative effort, between the Division of Building Safety, the Idaho Electrical Board, pump manufacturers, installers, end users, Department of Lands and other interested parties, began on April 15, 2016. This collaborative is tasked with providing rules for the safe installation of submersible well pumps within the State of Idaho.

**Policy:**

**It has been the duty of the submersible pump collaborative, to identify and propose standardized practices with the regard to new installations, and repair and replacement of existing installations, of submersible well pumps employed in lakes, rivers, ponds, and streams in Idaho, and shall supplement, or improve upon, the requirements imposed by authority having jurisdiction (AHJ), and/or the requirements of adopted National Electrical Code (NEC), NFPA 70.**

**This policy, as proposed by the collaborative, amends NEC Article 682, for both new installations, and for repair and replacement installations. Existing submersible well pump installations located in bodies of water, shall not be repaired without applying for an electrical permit. Permitted repairs shall comply with all of the requirements of NEC Article 682 and any Idaho State adopted amendments.**

**This policy is proposed as follows:**

**NEC Article 682 as Amended for New Installations/Repair and Replacement**

**682 Part I. General.** *All aspects still apply.*

**682 Part II. Installation**

**682.10 Electrical Equipment and Transformers.** **Electrical equipment and transformers, including their enclosures, shall be specifically approved for the intended location. No portion of an enclosure for electrical equipment not identified for operation while submerged shall be located below the electrical datum plane.**

*Add New: Exception. All submersible well pumps used in bodies of water, must be labeled and listed in compliance with any one of the following - UL778, UL1004, UL2111 or other AHJ approved standard, until the use of submersible well pump motors are listed and*

*approved for use in bodies of water at a future date.*

**682.11 Location of Service Equipment.** On land, the service equipment for floating structures and submersible electrical equipment shall be located no closer than 1.5 m (5ft) horizontally from the shoreline and live parts shall be elevated a minimum of 300 mm (12 in.) above the electrical datum plane. Service equipment shall disconnect when the water level reaches the height of the established electrical datum plane.

*Add New: Exception. This rule shall not apply to service equipment that is located on or at the dwelling unit and is not susceptible to flooding.*

**682.12 Electrical Connections.** All electrical connections not intended for operation while submerged shall be located at least 300 mm (12 in.) above the deck of a floating or fixed structure, but not below the electrical datum plane.

**682.13 Wiring Methods and Installation.** Liquidtight flexible metal conduit or liquidtight flexible nonmetallic conduit with approved fittings shall be permitted for feeders and where flexible connections are required for services. Extra-hard usage portable power cable listed for both wet locations and sunlight resistance shall be permitted for a feeder or a branch circuit where flexibility is required. Other wiring methods suitable for the location shall be permitted to be installed where flexibility is not required. Temporary wiring in accordance with 590.4 shall be permitted.

*Add New: Exception No 1. Wiring methods such as HDPE schedule 80 electrical conduit or its equivalent or greater, and clearly marked at a minimum "Caution Electrical" to indicate that it contains electrical conductors shall be approved. It shall be buried whenever practical, and in accordance with other regulatory agency policies. The use of gray HDPE water pipe rated at 250 PSI (eg. SIDR-7 or DR-9) is suitable for use as a chase only when the following conditions are met:*

- A. When internal conductors are jacketed submersible pump cable.*
- B. When used in continuous lengths, directly buried, or secured on a shoreline above and below the water line.*
- C. When submersible pump wiring terminations in the body of water according to 682.13 Exception No. 2 are met.*

*Add New: Exception No 2. Any listed and approved splices required to be made at the submersible well pump itself, outside of a recognized submersed pump sleeve or housing, when wires are too large to be housed inside said sleeve, shall be covered with a non-metallic, impact resistant material, no less than .25 inches thick, such as heavy duty heat shrink or other equivalent method approved by the AHJ. (Eg. install a heat shrink over the sleeve or housing that the submersible well pump is installed in, and then recover (apply heat) the heat shrink over both the HDPE and the water line). At least 6" shall be over the sleeve and at least 12" over the HDPE and*

water line.

*Add New: Exception No. 3. Pipe, conduit, PVC well casing, or other electrically unlisted tubing may be used as a chase (not as a raceway) to protect conductors or cables from physical damage. Conductors or cables within a chase shall be rated for the location.*

#### **682.14 Submersible or Floating Equipment Power Connections.**

**Submersible or floating equipment shall be cord – and plug-connected, using extra-hard usage cord, as designated in Table 400.4, and listed with a “W” suffix. The plug and receptacle combination shall be arranged to be suitable for the location while in use. Disconnecting means shall be provided to isolate each submersible or floating electrical equipment from its supply connection(s) without requiring the plug to be removed from the receptacle.**

**Existing Exception No. 1: Equipment listed for direct connection and equipment anchored in place and incapable of routine movement cause by water current or wind shall be permitted to be connected using wiring methods covered in 682.13.**

*Add New: Exception No. 2. Submersible well pumps shall be considered directly connected and shall be anchored in place. Ballast is an acceptable form of anchoring.*

**A. Type and Marking. The disconnecting means shall consist of a circuit breaker, a switch, or both, or a molded case switch, and shall be specifically marked to designate which receptacle or other outlet it controls.**

*Add New: Exception No. 1. Motor controller circuits (remotely located stop pushbutton, disconnect, relay, switch) in a non-metallic enclosure shall be accepted as a required disconnecting means when a controller location is not practical, or where terrain or other obstacle(s) prevent installation of actual operating motor controller in this location, and shall be placed no closer than five feet from but within sight of the shoreline, and marked at a minimum “Emergency Pump Stop”, or “Emergency Stop” with other obvious indication on the visible side of the enclosure, that it is for a pump. It shall be elevated not less than 12” above the datum plane.*

*Add New: Exception No. 2. An equipotential plane is not required for disconnecting means with non-metallic enclosures.*

**B. Location. The disconnecting means shall be readily accessible on land, located not more than 750 mm (30 in.) from the receptacle it controls, and shall be located in the supply circuit ahead of the receptacle. The disconnecting means shall be located within sight of but not closer than 1.5 m (5 ft) from the shoreline and shall be elevated not less than 300 mm (12 in.) above the datum plane.**

*Add New: Exception. Motor controller circuits (remotely located stop pushbutton, disconnect, relay, switch) in a non-metallic enclosure shall be accepted as a required*

*disconnecting means when it installation is not practical, or where terrain or other obstacle(s) prevent installation of actual operating motor controller in this location, and shall be placed no closer than five feet from but within sight of the shoreline, and marked at a minimum “Emergency Pump Stop”, or “Emergency Stop” with other obvious indication on the visible side of the enclosure, that it is for a pump. It shall be elevated not less than 12” above the datum plane.*

**682.15 Ground-Fault Circuit-Interrupter (GFCI) Protection. Fifteen (15) and twenty (20) ampere single-phase, 125 volt through 250 volt receptacles installed outdoors and in or on floating buildings or structures within the electrical datum plane area that are used for storage, maintenance, or repair where portable electric hand tools, electrical diagnostic equipment, or portable lighting equipment are to be used shall be provided with GFCI protection. The GFCI protection device shall be located not less than 300 mm (12 in.) above the established electrical datum plane.**

*Add New: Exception No. 1. For submersible pumps located in bodies of water, and are rated 60 amperes maximum, 250 volts maximum, shall have GFCI or Ground Fault Equipment Protection designed to trip at a maximum of 30 milliamps or less, protected by means selected by a licensed installer, meeting listing or labeling requirements, and inspected by the AHJ prior to submersion in bodies of water.*

*Add New: Exception No. 2. For installations or repair and replacement of submersible pumps located in bodies of water, that are rated over 60 amperes, and rated at any voltage, shall be evaluated by a qualified designer (Experienced Licensed Contractor), or involve Engineering or be engineered, for each specific application, with the utmost goal of public safety. Whenever possible, GFCI or Ground Fault Equipment Protection designed to trip at a maximum of 30 milliamps or less, meeting listing or labeling requirements, shall be installed, then inspected by the AHJ prior to submersion in bodies of water.*

### **682 Part III.**

**682.30 Grounding.** *All aspects still apply.*

**682.31 Equipment Grounding Conductors.**

**A. Type.** Equipment grounding conductors shall be insulated copper conductors sized in accordance with 250.122 but not smaller than 12 AWG.

**B.** *All aspects still apply.*

**C.** *All aspects still apply.*

**D.** *All aspects still apply.*

**682.33 Bonding of Non-Current-Carrying Metal Parts.** *All aspects still apply.*

**682.33 Equipotential Planes and Bonding of Equipotential Planes.** An equipotential

plane shall be installed where required in this section to mitigate step and touch voltages at electrical equipment.

**A. Areas Requiring Equipotential Planes.** Equipotential planes shall be installed adjacent to all outdoor service equipment or disconnecting means that control equipment in or on water, that have a metallic enclosure and controls accessible to personnel, and that are likely to become energized. The equipotential plane shall encompass the area around the equipment and shall extend out not less than 900 mm (36 in.) in all directions from which a person would be able to stand and come in contact with the equipment.

*Add New: Exception. Submersible pump control panels and remote control circuit panels used to disconnect submersible pumps, and that are enclosed in non-metallic enclosures, do not require equipotential planes.*

**B. Areas Not Requiring Equipotential Planes.** Equipotential planes shall not be required for the controlled equipment supplied by the service equipment or disconnecting means.

*Add New: Exception. All circuits rated 60 amperes maximum and 110-250 volts, any phase, shall contain ground fault protection, in accordance with 682.15, for the motor leads that are located in a body of water, at a minimum.*

**C. Bonding.** Equipotential planes shall be bonded to the electrical grounding system. The bonding conductor shall be solid copper, insulated, covered or bare, and not smaller than 8 AWG. Connections shall be made by exothermic welding or by listed pressure connectors or clamps that are labeled as being suitable for the purpose and are of stainless steel, brass, copper, or copper alloy.

**Other articles and sections of the adopted National Electric Code not specifically addressed by House Bill 643 may apply.**

This submersible pump collaborative acknowledges and accepts the reality of the hazards associated with electrical equipment in water. During the organizing and discussion of the collaborative concerns, it remains evident that all parties want to ensure the safe installation of submersible well pumps.

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