COUNTY OF WINNEBAGO

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SWIMMING POOLS, SPAS AND HOT TUBS ELECTRICAL EQUIPMENT LOCATION AND CLEARANCES

Section E4103

E4103.1 Receptacle outlets.

Receptacles outlets shall be installed and located in accordance with Sections E4103.1.1 through E4103.1.5. Distances shall be measured as the shortest path that an appliance supply cord connected to the receptacle would follow without penetrating a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier.

E4103.1.1 Location.

Receptacles that provide power for water-pump motors or other loads directly related to the circulation and sanitation system shall be permitted to be located between 5 feet and 10 feet (1524mm and 3048mm) from the inside walls of pools and outdoor spas and hot tubs, and, where so located, shall be single and of the locking and grounding type and shall be protected by ground-fault circuit interrupters.

Other receptacles on the property shall be located not less than 10 feet (3048mm) from the inside walls of pools and outdoor spas and hot tubs.

E4103.1.2 Where required.

At least one 125-volt 15- or 20-ampere receptacle supplied by a general-purpose branch circuit shall be located a minimum of 10 feet (3048mm) from and not more than 20 feet (6096mm) from the inside wall of pools and outdoor spas and hot tubs. This receptacle shall be located not more that 6 feet, 6 inches (1981mm) above the floor, platform or grade level serving the pool, spa or hot tub.

E4103.1.3 GFCI protection.

All 125-volt receptacles located within 20 feet (6096mm) of the inside walls of pools and outdoor spas and hot tubs shall be protected by a ground-fault circuit-interrupter.

E4103.1.4 Indoor locations.

Receptacles shall be located not less than 5 feet (1524mm) from the inside walls of indoor spas and hot tubs. A minimum of one 125-volt receptacle shall be located between 5 feet (1524mm) and 10 feet (3048mm) from the inside walls of indoor spas or hot tubs.

E4103.1.5 Indoor GFCI protection.

One hundred twenty-five-volt receptacles located within 10 feet (3048mm) of the inside walls of spas and hot tubs installed indoors shall be protected by ground-fault circuit-interrupters. One hundred twenty-five-volt receptacles located within 5 feet (1524mm) of the inside walls of hydro massage bathtubs shall be protected by a ground-fault circuit-interrupter.

E4103.2 Switching devices.

Switching devices shall be located not less than 5 feet (1524mm) horizontally from the inside walls of pools, spas and hot tubs except where separated from the pool, spa or hot tub by a solid fence, wall, or other permanent barrier. Switching devices located in a room or area containing a hydro massage bathtub shall be located in accordance with the general requirements of this code.

E4103.3 Disconnecting means.

An accessible disconnecting means to disconnect all ungrounded conductors for all utilization equipment, other lighting, shall be provided and located within sight from all pools, spas, and hot tub equipment, and shall be located not less than 5 feet (1524mm) from the inside walls of the pool, spa or hot tub.

E4103.4.5 GFCI protection.

Luminaries and outlets that are installed in the area extending between 5 feet (1524mm) and 10 feet (3048mm) from the inside walls of pools and outdoor spas and hot tubs shall be protected by ground-fault circuit-interrupters except where such fixtures and outlets are installed not less than 5 feet (1524mm) above the maximum water level and are rigidly attached to the structure.

E4103.6 Underground wiring.

Underground wiring shall not be installed under or within the area extending 5 feet (1524mm) horizontally from the inside walls of pools and outdoor hot tubs and spas except where the wiring is installed to supply pool, spa or hot tub equipment or where space limitations prevent wiring from being routed 5 feet (1524mm) or more horizontally from the inside walls. Where installed within 5 feet (1524mm) of the inside walls, the wiring method shall be rigid metal conduit, intermediate metal conduit or a nonmetallic raceway system. Metal conduit shall be corrosion resistant and suitable for the location. The minimum raceway burial depth shall be in accordance with Table E4103.6.

TABLE E4103.6
MINIMUM BURIAL DEPTHS

WIRING METHOD	MIN. BURIAL DEPTH (inches)
Rigid metal conduit	6
Intermediate metal conduit	6
Nonmetallic raceways listed for direct burial without concrete encasement	18
Other approved raceways (a)	18

For SI: 1 inch = 25.4mm.

(a) Raceways approved for burial only where concrete-encased shall require a concrete envelope not less than 2 inches in thickness.

BONDING
SECTION E4104

E4104.1 Bonded parts.

The following parts shall be bonded together:

1. All metallic parts of pool, spa and hot tub structure, including the reinforcing metal of pool, spa and hot tub shells, coping stones, and decks. The usual steel tie wires shall be considered suitable for bonding the reinforcing steel together, and welding or special clamping shall not be required. Such tie wires shall be made tight. Where reinforcing steel is effectively insulated by a listed encapsulating nonconductive compound, at the time of manufacture and installation, it shall not be required to be bonded. Where reinforcing steel is encapsulated with a nonconductive compound, provisions shall be made for an alternate means to eliminate voltage gradients that would otherwise be provided by un-encapsulated bonded reinforcing steel.

2. All forming shells and mounting brackets of no-niche luminaries except where a listed low-voltage lighting system is used that does not require bonding.

3. All metal fittings within or attached to pool, spa and hot tub structures. Isolated parts that are not over 4 inches (102mm) in any dimension and do not penetrate into the pool structure more than 1 inch (25.4mm) shall not require bonding. The metal bands or hoops used to secure wooden staves for a hot tub or spa shall not be required to be bonded.

4. Metal parts of electrical equipment associated with pool, spa and hot tub water circulating systems, including pump motors and metal parts of equipment associated with pool covers, including electric motors. Metal parts of listed equipment incorporating an approved system of double insulation and providing a means for grounding internal no accessible, concurrent-carrying metal parts shall not be bonded. Where a double-insulated water-pump motor is installed under the provisions of this section, a solid 8AWG copper conductor that is of sufficient length to make a bonding connection to a replacement motor shall be extended from the bonding grid to an accessible point in the motor vicinity. Where there is no connection between the

swimming pool bonding grid and the equipment grounding system for the premises, this bonding conductor shall be connected to the equipment grounding conductor of the motor circuit.

5. Metal-sheathed cables and raceways, metal piping and all fixed metal parts that are within 5 feet (1524mm) horizontally of the inside walls of the pool, spa or hot tub and that are within 12 feet (3658mm) above the maximum water level of the pool or any observation stands, towers or platforms, or from any diving structures, and that are not separated from the pool by a permanent barrier.

NOTE: For pool water heaters rated at more than 50 amperes and having specific instructions regarding bonding and grounding, only those parts designated to bonding shall be bonded and only those parts designated to be grounded shall be grounded.

E4104.3 Methods of bonding.

It shall not be the intent to require that the 8 AWG or larger solid copper bonding conductor be extended or attached to any remote paperboard, service equipment, or any electrode, but only that it shall be employed to eliminate voltage gradients in the pool area as prescribed. Bonding shall be accomplished by one or more of the following methods:

1. Common Bonding Grid. The parts specified in Section E4104.1 above shall be connected to a common bonding grid with a solid copper conductor, insulated, covered, or bare, not smaller than 8 AWG. Connection shall be made by exothermic welding or by pressure connectors or clamps that are labeled as being suitable for the purpose and that are made of stainless steel, brass, copper or copper alloy.

The common bonding grid shall be permitted to be any of the following:

1.1 The structural reinforcing steel of a concrete pool where the reinforcing rods are bonded together by the usual steel tie wires made up tight or the equivalent: or

1.2 The wall of a bolted or welded metal pool; or

1.3 A solid copper conductor, insulated, covered, or bare, not smaller that 8 AWG.

2. For hot tubs and spas, metal to metal mounting on a common frame or base.

3. The interconnection of threaded metal piping and fittings.

GROUNDING
Section E4105

E4105.1 Equipment to be grounded.

The following equipment shall be grounded:

1. Wet-niche, dry-niche and no-niche underwater luminaries other than those low-voltage systems listed for the application without a grounding conductor.

2. All electrical equipment located within 5 feet (1524mm) of the inside wall of the pool, spa or hot tub.

3. All electrical equipment associated with the re-circulating system of the pool, spa or hot tub.

4. Junction boxes.

5. Transformer enclosures.

6. Ground-fault circuit-interrupters.

7. Panelboards that are not part of the service equipment and that supply any electrical equipment associated with the pool, spa or hot tub.

E4105.4 Flexible cords.

Wet-niche or no-niche luminaries that are supplied by a flexible cord or cable shall have all exposed concurrent-carrying metal parts grounded by an insulated copper equipment grounding conductor that is an integral part of the cord or cable. This grounding conductor shall be connected to a grounding terminal in the supply junction box, transformer enclosure, or other enclosure. The grounding conductor shall not be smaller than the supply conductors and not smaller that 16 AWG.

E4105.5 Motors.

Pool-associated motors shall be connected to a copper equipment grounding conductor sized in accordance with Table E3808.12, but not smaller than 12 AWG.

EQUIPMENT INSTALLATION
Section E4106

E4106.11 Electric pool water heaters.

All electric pool water heaters shall have the heating elements subdivided into loads not exceeding 48 amperes and protected at not more than 60 amperes. The amp capacity of the branch-circuit conductors and the rating or setting of over-current protective devices shall be not less than 125 percent of the total nameplate load rating.

E4106.12 Pool area heating.

The provisions of Sections E4106.12.1 through E4106.12.3 shall apply to all pool deck areas, including a covered pool, where electrically operated comfort heating units are installed within 20 feet (6096mm) of the inside wall of the pool.

E4106.12.1 Unit heaters.

Unit heaters shall be rigidly mounted to the structure and shall be of the totally enclosed or guarded types. Unit heaters shall not be mounted over the pool or within the area extending 5 feet (1524mm) horizontally from the inside walls of a pool.

E4106.12.2 Permanently wired radiant heaters.

Electric radiant heaters shall be suitably guarded and securely fastened to their mounting devices. Heaters shall not be installed over a pool or within the area extending 5 feet (1524mm) horizontally from the inside walls of the pool and shall be mounted not less than 12 feet (3658mm) vertically above the pool deck.

E4106.12.3 Radiant heating cables prohibited.

Radiant heating cables embedded in or below the deck shall be prohibited.