

Bulletin 68-7-15

Swimming pool, hot tub, and spa installations

Rules 12-012, 68-000, 68-056, 68-058, 68-064, 68-068, 68-302, 68-306, and 68-404

Issued May 2022

Supersedes Bulletin 64-7-14

Scope

- 1) Swimming pools - general
- 2) Grounding & bonding
 - a) Bonding for pool structures
 - i) Bonding a metal pool shell
 - ii) Bonding a pool with reinforcing steel
 - iii) Bonding a pool with encapsulating reinforcing steel
 - iv) Bonding a nonconductive pool
 - b) Equipotential bonding for pool equipment
- 3) Wiring methods
- 4) Ground fault circuit interrupter (GFCI)
- 5) Emergency shut-off switch for a public pool, spa or hot tub
- 6) Cord connected hydromassage bathtubs
- 7) Arc-fault circuit interrupter protection (AFCI)

Background

Questions have been asked on applying Section 68 of the Ontario Electrical Safety Code (OESC). The intent of this bulletin is to provide answers for the most frequently asked questions to ensure the consistent application of the OESC.

1) Swimming pools - general

Subrule 68-000 2) lists the types of pools that are included in the scope of Section 68. This includes above-ground pools, as well as in-ground pools. Therefore, all requirements of Section 68 apply to both above-ground pools, as well as in-ground pools.

Question 1

Does the OESC permit the installation of extra low voltage landscape lighting systems within 3 m of the edge of a swimming pool, spa or hot tub?

Answer 1

Yes, provided that the power supply is GFCI protected, as required by Rule 68-068, and does not bear the marking "DO NOT MOUNT POWER SUPPLY OR LUMINAIRES WITHIN 3 m OF A SWIMMING POOL OR SPA." (Rule 2-034)

Rationale 1

C22.2 No. 250.7, Extra-low-voltage landscape lighting systems, states power supply marking and instructions states "A power supply shall be marked in accordance with Table 20.101.1 and shall be provided with installation instructions in accordance with

Table 20.102.1, Items 2.1 to 2.11, as applicable." Item 2.8 in Table 20.102.1 states "DO NOT MOUNT POWER SUPPLY OR LUMINAIRES WITHIN 3 m OF A SWIMMING POOL OR SPA".

2) Grounding & bonding

Rule 68-058 4) requires the minimum size of bonding conductors for permanently installed pools and all in-ground pools to be no smaller than No. 6 AWG copper. For all other pools, where the bonding conductor is incorporated within a cable assembly or raceway, the bonding conductor shall be sized in accordance with Rule 10-616. The bonding conductor is to bond both the metal parts of the pool and the other non-electrical equipment to the non-current-carrying metal parts of the electrical equipment.

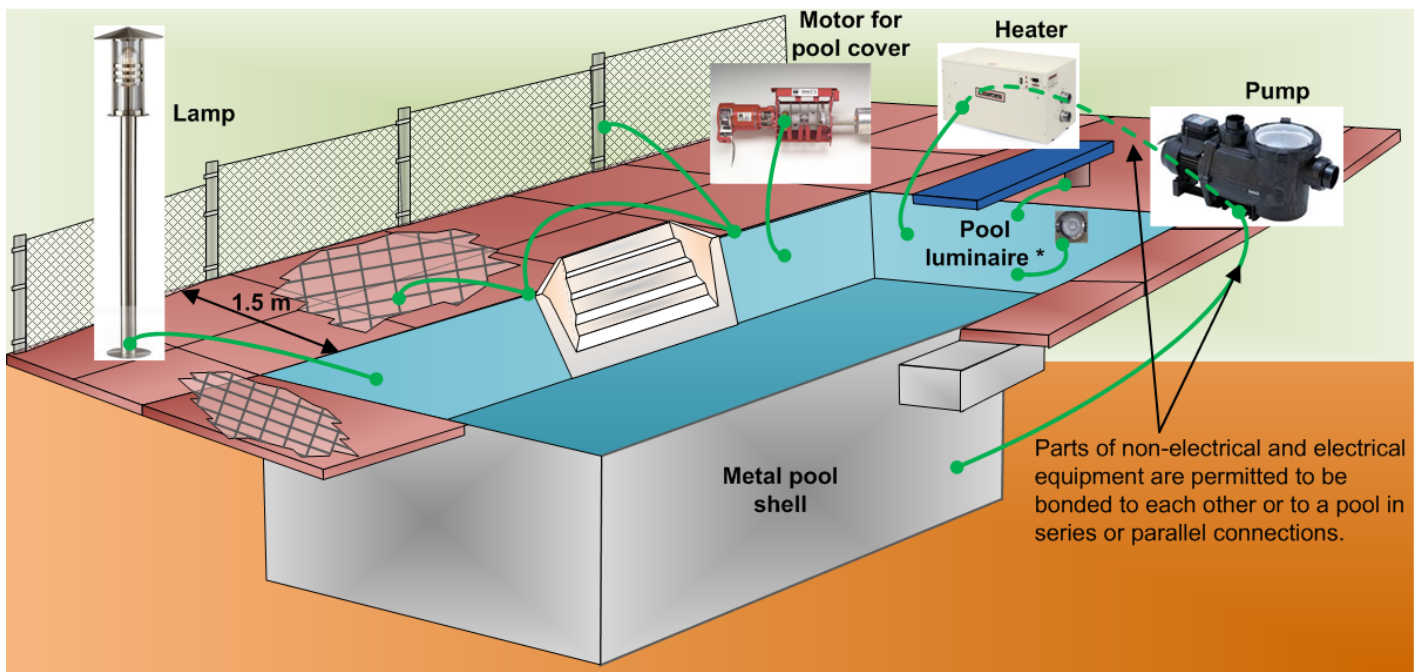
a) Bonding for pool structures

The OESC provides bonding requirements for pools with conductive pool shells such as pools with a metal shell, poured or concrete blocks with structural reinforcing steel or encapsulated reinforcing steel.

i) Bonding a metal pool shell

Rule 68-058 8) requires a galvanized steel pool shell made up of individual panels securely bolted together, to be bonded in at least one location to equipment specified in Subrule 1) and as shown in Diagram B1.

Diagram B1 – Bonding a metal pool shell



Question 2

If a metal pool shell has fiberglass stairs installed that break the continuous shell of the pool as shown on the Photo B1, is it only required to be bonded at one point as per Rule 68-058 8)?

Answer 2

Yes, provided a bonding jumper (of the same size as the bonding conductor) is provided across the bonding path break, as per Diagram B1.

Rationale 2

A metal pool shell is only required to be bonded once, if it is continuous. If there is a break in the outer shell by a non-conductive material (i.e. fiberglass stairs), then a jumper is required across the break (or bond each section individually).

Photo B1 – Metal pool with fiberglass stairs and pool reinforcing brackets



Question 3

Does the Electrical Safety Authority (ESA) require the bonding of an above ground steel pool shell where the individual panels are surrounded by non-conductive supports, as shown in Photo B2?

Answer 3

No, notwithstanding Rule 68-058 1) bonding shall not be required.

Rationale 3

As each panel is separated by insulated resin material which makes the pool shell not continuous, or in contact with the earth or the pool water, bonding of the pool shell will provide no benefit to the elimination of touch potential, and there is no location to connect the bond wire to.

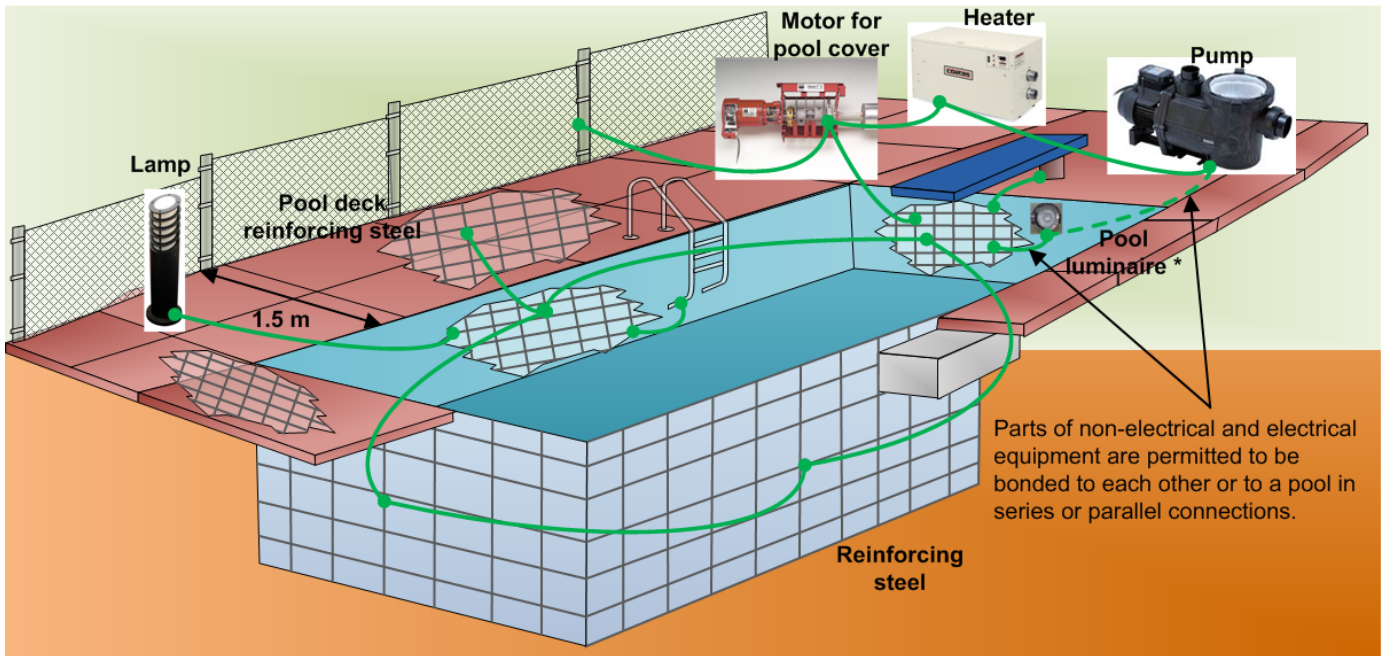
Photo B2 – Above ground pool with non-conductive supports



ii) Bonding a pool with reinforcing steel

Rule 68-058 2) requires the pool reinforcing steel to be bonded together with a minimum of four connections, equally spaced around the perimeter and to equipment specified in Subrule 1), as shown in Diagram B2.

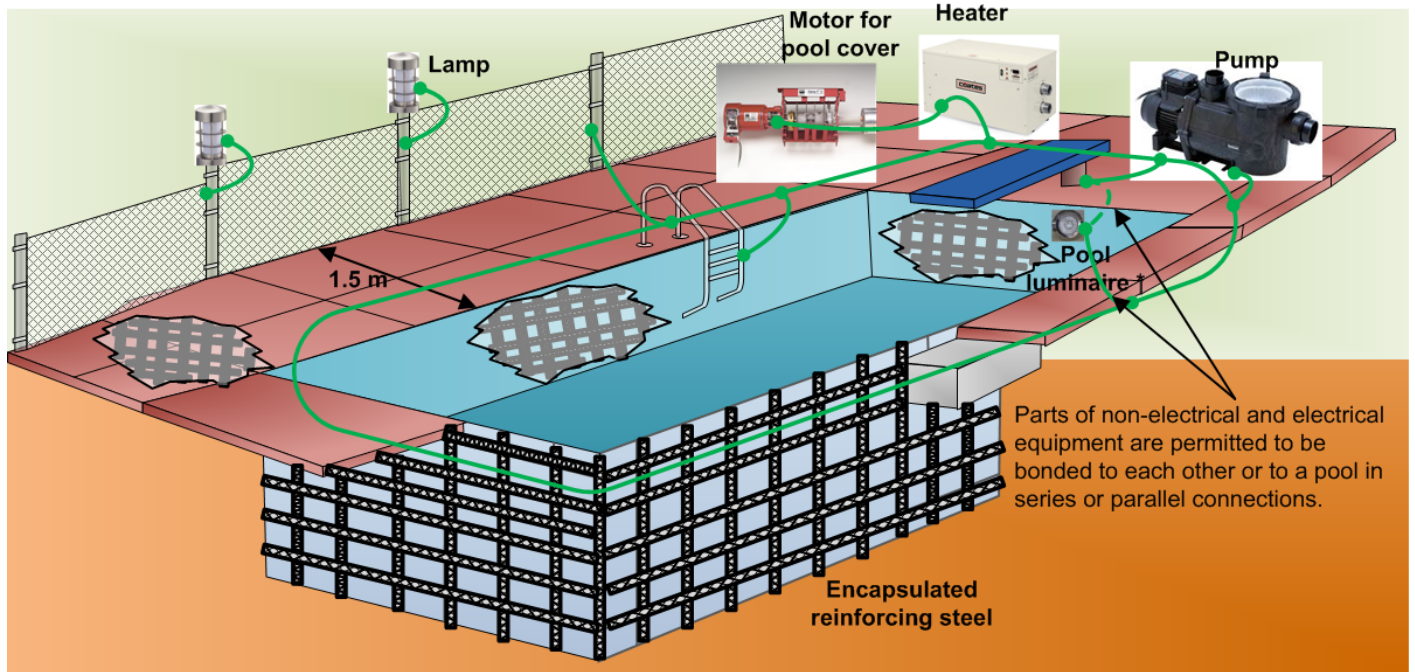
Diagram B2 – Bonding a pool with structural reinforcing steel



iii) Bonding a pool with encapsulated reinforcing steel

When pool reinforcing steel is encapsulated, with a non-conductive compound, a bonding grid around the pool cannot be formed. Rule 68-058 3) and Appendix B note requires a bonding loop (no smaller than No. 6 AWG copper) around the pool, if the steel is encapsulated, as per Diagram B3. Equipment specified in Subrule 1) is required to be bonded to that loop.

Diagram B3 – Bonding a pool with structural reinforcing steel that is encapsulated



Note

For Diagrams B1, B2 and B3:

*Metallic parts

iv) Bonding a nonconductive pool

The OESC does not have bonding requirements for pools with nonconductive materials, such as fibreglass composite (as shown in Photo B3) or resin. If other conductive, non-electrical equipment associated with the pool, such as ladders or fences are installed, they would be required to be bonded to the pool electrical equipment.

Photo B3 – Fibreglass pool



Question 4

Can the split bolts or ground lugs used for pool bonding be aluminum?

Answer 4

No. Any split bolts or ground lugs, located underground, shall be approved for earth burial. Components located outdoors shall be approved as suitable for wet locations.

Rule 2-034 requires approved electrical equipment of a kind or type and rating approved for the specific purpose for which it is to be employed.

Question 5

Does the deck reinforcing steel need to be bonded?

Answer 5

Yes, Rule 68-058 1) requires deck reinforcing steel to be bonded together and to other metal parts of the pool. See Diagram B1 and B2.

Additional bonding connections for the deck of the metal pool shell are not required when:

- The pool reinforcing bracing is part of the metal pool shell, as shown in Photo B1;
- The pool reinforcing steel is pressure fit to the continuous metal pool shell, as shown in Photo B4 and B5; or
- A conductive mesh (laid down over the gravel below the deck), is tie-wired and in solid contact with the continuous metal pool shell, as shown in Photo B5.

Photo B4 – Pool reinforcing bracket that is pressure fitted

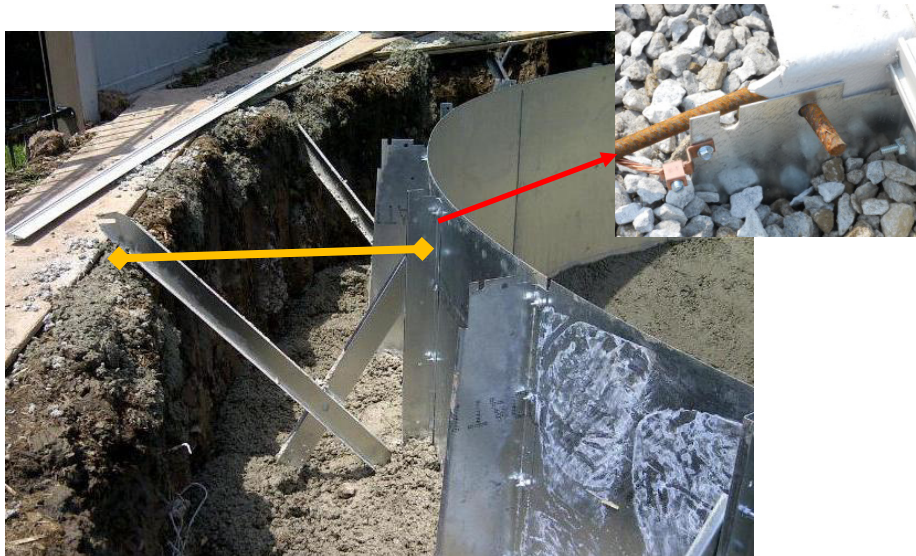
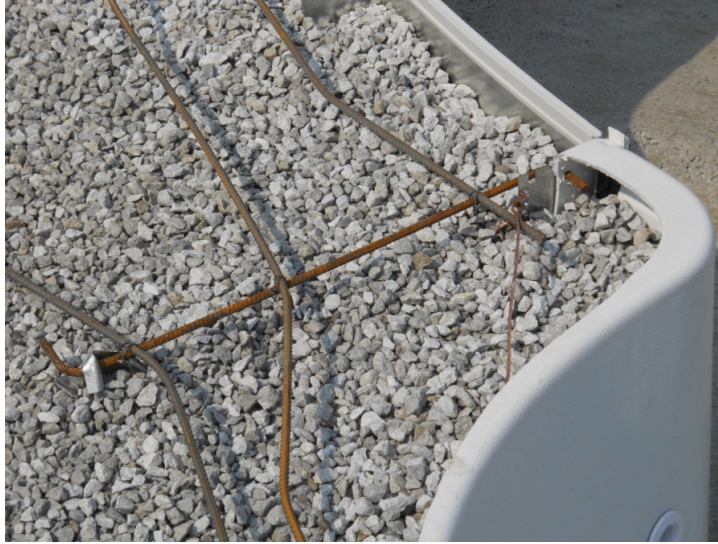


Photo B5 – A conductive mesh below the deck in solid contact with the pool



b) Equipotential bonding for pool equipment

Rule 68-058 1) requires metal parts of the pool and other non-electrical equipment associated with the pool (metal piping, pool reinforcing steel, metal ladders, diving board supports, fences, etc.) to be bonded together and to non-current carrying metal parts of electrical equipment associated with the pool (e.g. pool circulating pump), as per Diagrams B1, B2 and B3. Parts of non-electrical and electrical equipment are permitted to be bonded to each other or to the pool in series or parallel connections.

Rule 68-058 1) requires metal fences within 1.5 m of the inside walls of the pool to be bonded, as per Diagrams B1, B2 and B3.

Question 6

Is a pool bonding conductor, specified by Rule 68-058 1), required to be connected to a grounding electrode?

Answer 6

No. A pool bonding conductor, specified by Rule 68-058 1), is not required to be connected to a grounding electrode. The bonding required by Rule 68-058 1) is installed to eliminate voltage gradients in the pool area and to ensure that all metallic parts described in the rule are at the same electrical potential, as per Appendix B Note to Rule 68-058 1).

Question 7

Does the installation of new pool equipment or replacement of existing pool equipment (for example, the installation of a heater where there was no heater before or a pump replacement) at an existing pool built prior to 2009, where no pool bonding was previously installed, require bonding of the pool and equipment be brought into compliance with Rule 68-058 1) of current OESC?

Answer 7

No, provided that the new or replaced equipment is not located within 3 m of the inside wall of the pool or is suitably separated from the pool by a fence, wall, or other permanent barrier.

Question 8

Do we need to bond a metallic gas pipe that is located within 1.5 m of the inside walls of the pool?

Answer 8

Yes. The gas pipe shall be bonded, as per Rule 68-058 1).

Question 9

Does Rule 68-058 require bonding of the metal covers of pool drains, where the drain body is of non-metallic material?

Answer 9

No. The cover does not have provision for bonding and it is not practicable to do so. The cover is a minor metal item not a large item as described in the Rule "non-electrical equipment associated with the pool, such as piping, pool reinforcing steel, ladders, diving board supports, and fences". The cover is mounted on non-conductive material and does not have a reference to remote earth.

Question 10

Where a panelboard feeds pool electrical equipment that is bonded to conductive non-electrical equipment associated with the pool, in compliance with Rule 68-058, is an additional No.6 AWG bonding conductor required between the panelboard and the pool electrical equipment?

Answer 10

No. The OESC does not define what is meant by "pool electrical equipment". In order to facilitate consistent application of the rule by all OESC users, the following direction has been developed.

Direction 10

The pool electrical equipment includes electrical equipment associated with the pool water circulating system, including pump motors, pool water heaters, and associated with pool covers, including electric motors.

3) Wiring methods

Question 11

Is it acceptable to install an NMD90 cable in a PVC conduit installed underground?

Answer 11

No, Rule 12-930 states raceways installed underground or in concrete slabs, in direct contact with moist earth, shall comply with Section 22 Rules for Category 1 locations.

Rule 22-200 requires individual conductors and non-metallic sheathed cables in Category 1 areas to be suitable for use in wet locations. Non-metallic sheathed cables shall be of the NMWU* type.

NMD90 non-metallic sheathed cable is suitable for use in dry or damp locations only.

Note

Additional jumpers or alternate wiring methods may be required when using NMWU cable as it has a 60°C temperature rating and may be lower than the requirements for termination in most panelboards or pool equipment.

Notwithstanding Rule 12-902 and Table 19, NMWU cable is permitted in a raceway.

Question 12

Is it acceptable to install an NMD90 cable in a surface mounted PVC conduit above grade, such as along the brick wall of a house?

Answer 12

Yes, PVC raceway installed above grade is considered a dry or damp location.

Note

Where a PVC raceway passes through a wall, from a warm area to a cold area (interior to exterior of a house), it shall be sealed to prevent condensation in the raceway, as per Rule 22-302.

Notwithstanding Rule 12-902 and Table 19, NMD90 cable is permitted in a raceway.

Question 13

Is a gas pipe permitted to be installed in the same trench as electrical wiring supplying pool equipment?

Answer 13

Yes, provided that the electrical wiring and the gas piping are separated by at least 300 mm (12") horizontally within the trench (Rule 12-012 and CSA Standard C22.3 No. 7 for Underground Systems). Where the electrical wiring and gas cross each other, they shall be separated vertically by a minimum of 300 mm at right angles or close to at the point of crossing. Where it is not possible to achieve this clearance, mechanical protection is required such as using a sand bag.

Question 14

With an above-ground pool, what is a minimum distance between an underground PVC conduit or direct buried cable and the pool?

Answer 14

If the PVC raceway or direct buried cable is supplying equipment directly related to the pool (pump, lighting, etc.) and the circuit is GFCI protected, there is no minimum separation required.

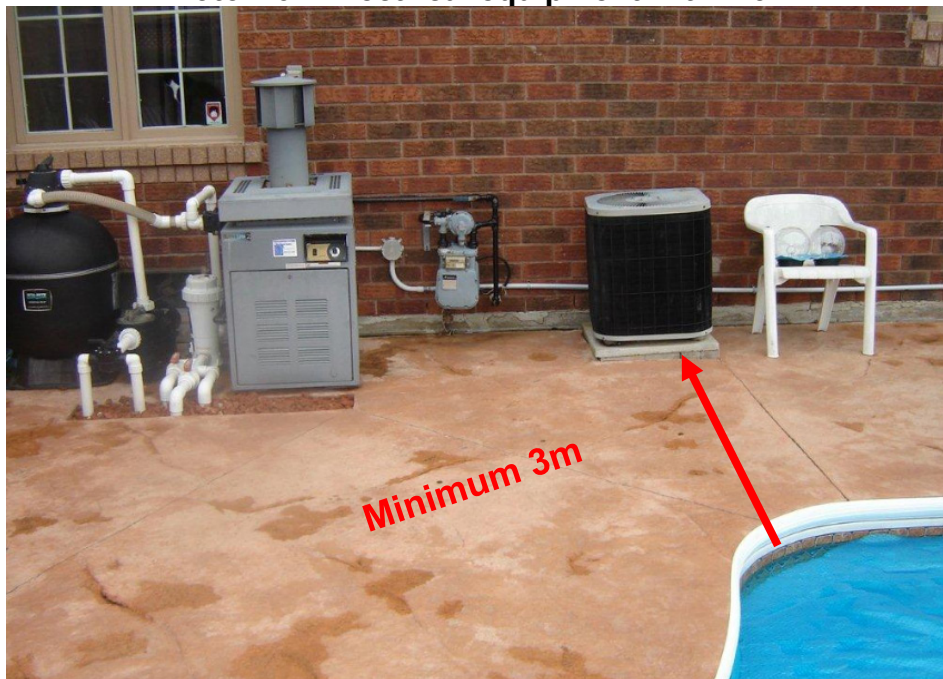
If a PVC raceway or direct buried cable is supplying non-pool related equipment, it must maintain a distance from the inside walls of the pool by the distances specified in Table 61.

4) Ground fault circuit interrupter (GFCI)

Question 15

If a pool, spa or hot tub is installed within 3 m of electrical equipment, as shown in Photo B6, does the equipment require GFCI protection? Examples are pool pumps, lighting, central air conditioning unit, electrical revenue meter, etc.

Photo B6 – Electrical equipment within 3 m



Answer 15

Yes, Rule 68-068 requires electrical equipment that is located 3 m of the inside walls of the pool to be GFCI protected unless the electrical equipment is suitably separated from the pool area by a fence, wall, or other permanent barrier.

Note

- If the pump is cord connected to a receptacle of 5-15R or 5-20R configuration, Rule 26-704 2) requires that receptacles of 5-15R or 5-20R configuration installed outdoors, be protected by a GFCI of the Class A Type. In this case, it would not matter if the pump were located further than 3 m.
- If the pump is cord connected to a receptacle other than 5-15R or 5-20R configuration and the pool pump is within 3 m of the pool, the OESC requires a GFCI of Class A type protection for the branch circuit supplying this receptacle.
- If the pump is cord connected to a receptacle other than 5-15R or 5-20R configuration and the pool pump is not within 3 m of the pool, GFCI protection is not required by the OESC.

Rule 26-708 requires receptacles exposed to the weather and of configurations 5-15R, 5-20R, 5-20RA, 6-15R, 6-20R, and 6-20RA to be provided with cover plates suitable for wet locations, whether or not a plug is inserted into the receptacle, and marked “Extra Duty.”

Question 16

Does the OESC set any specifications on this wall or barrier?

Answer 16

No. As long as the fence, wall or permanent barrier does not have openings or gaps, and prevents a person contacting the electrical equipment and the pool water simultaneously.

Question 17

How close are receptacles (Photo B7) permitted to be located to swimming pools/hot tubs?

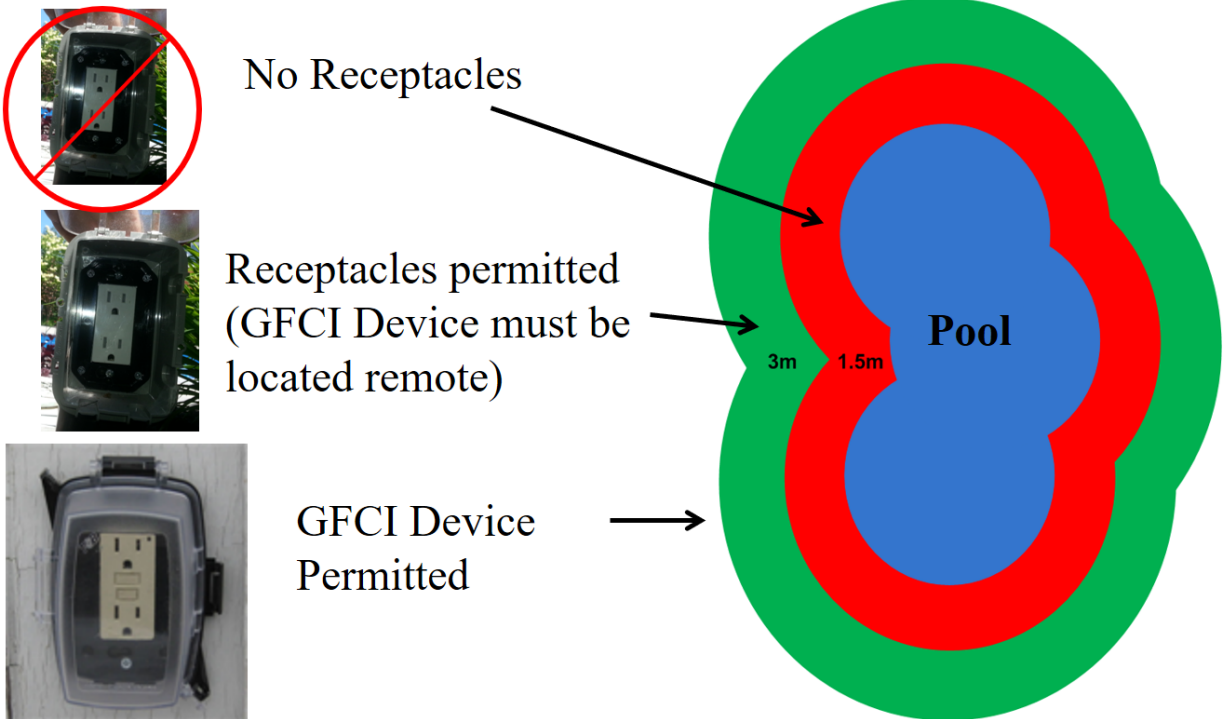
Answer 17

Rule 68-064 does not permit a receptacle to be located closer than 1.5 m to the pool (measured using a string to simulate a length of an electrical cord). In addition, Rule 68-068 does not permit the GFCI devices (Receptacles, Dead-fronts, or breakers) to be closer than 3 m to the pool unless guarded as per Answer 15. Diagram B4 provides additional information where receptacles are permitted.

Photo B7 – Receptacles near pools



Diagram B4 – Receptacles near pools



Question 18

Is a receptacle for a cord connected pump permitted to be located within 1.5 m of a pool or hot tub?

Answer 18

No. Rule 68-064 requires a receptacle to be located not closer than 1.5 m to the pool. See Diagram B4.

Question 19

Does a heater or pool pump located more than 3 m away, or isolated by suitable barrier, supplying a hot tub or spa that shares common water circulation with a pool, as per Photo B8, require ground fault circuit interruption?

Photo B8 – Hot tub as part of the pool



Answer 19

No, not unless required by the manufacturer. The hot tub is part of the pool and shall be inspected as part of the pool.

Question 20

Does the OESC require Class A ground fault protection for electrical equipment such as salt water chlorine generators located at more than 3 m from the inside wall of a pool?

Answer 20

No, unless required by the electrical equipment manufacturer.

Rationale 20

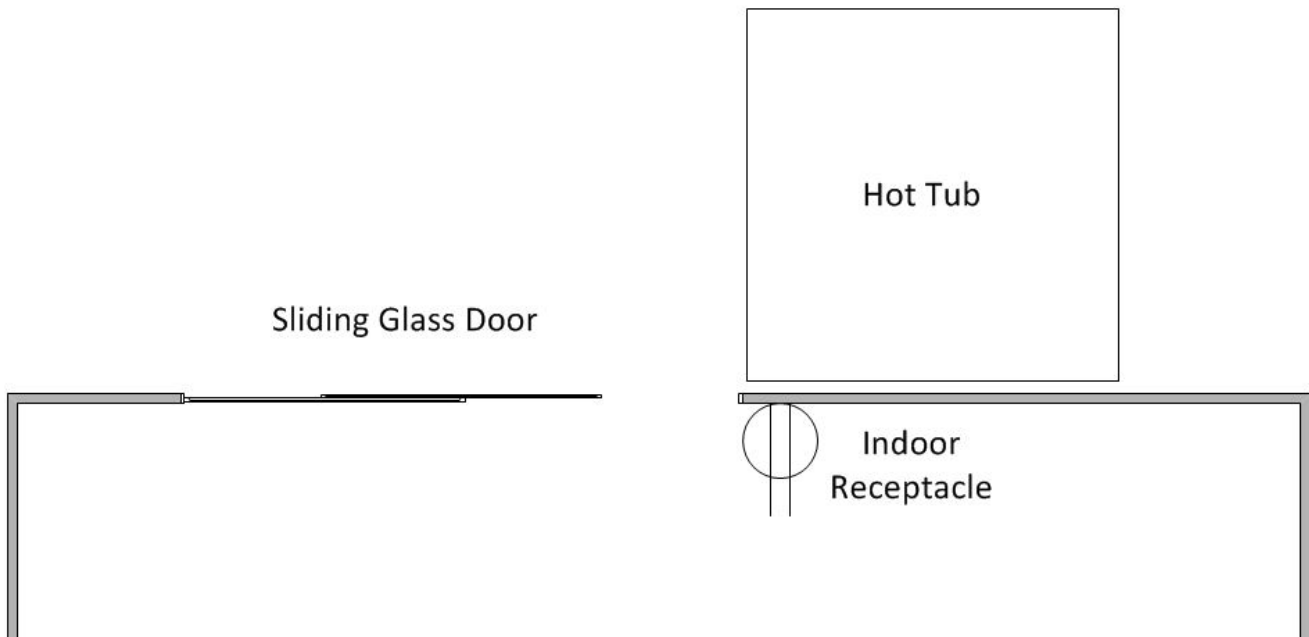
Where the equipment is located further than 3 m from the pool, spa or a hot tub or behind a suitable barrier, as per Rule 68-068, GFCI protection is not mandated specifically by the Part 1 Code. Also, recently amended CSA standard C22.2 No. 218.1 now includes certification requirements for electrolytic chlorine and bromine generators and does not provide requirements for ground fault protection for chlorinators. Although not mandated in Section 68 for all installations and part 2 standard for chlorinators, many manufacturers of associated pool equipment require Class A GFCI protection of their product, as per nameplate or installation instructions.

Question 21

When a swimming pool or hot tub is located adjacent to a building such as a shed or house that has various types of electrical equipment located on the interior side of the doorway as shown in Diagram B5 below, does the following minimum distances apply:

- 1.5 m for receptacles not containing an integral device remotely GFCI protected/ 3m for receptacles with integral GFCI (Rule 68-064);
- 3m for electrical equipment without GFCI protection (Rule 68-068 7) d));
- 3m for GFCI devices (Rule 68-068 6) b)); or
- 3m for luminaires without GFCI (Rule 68-066 6))?

Diagram B5 – Interior receptacles near pools or hot tubs



Answer 21

No

Rationale 21

These devices are considered suitably separated as the prescribed distances are not intended to pierce openings through doorways or windows.

5) Emergency shut-off switch for a public pool spa or hot tub

The emergency shut-off switch (stop button) shall be installed for each spa or hot tub, except for a spa or hot tub installed at a dwelling unit. The emergency shut-off switch is required by Rule 68-404 for a public spa. Public spa is defined under the Ontario Building Code(OBC) and Article 3.12.5.1 provides further requirements for the installation and connection of emergency shut-off switches.

The emergency shut-off switch shall be independent of the controls for a spa or a hot tub.

The emergency shut-off switch shall comply with Rule 68-404 4).

This would be accompanied by an emergency sign posted adjacent to the emergency stop button containing the words “IN THE EVENT OF AN EMERGENCY PUSH EMERGENCY STOP BUTTON AND USE EMERGENCY PHONE, AUDIBLE AND VISUAL SIGNAL WILL ACTIVATE.”

Note

Rule 68-404 requires controls for a spa or hot tub to be located behind a barrier or not less than 1 m horizontally from the spa or hot tub unless they are an integral part of an approved factory built unit.

Question 22

Is GFCI protection required if the emergency shut-off switch is extra low voltage e.g. 24 V?

Answer 22

Yes, Rule 68-068 7) requires GFCI protection for the emergency shut-off switch, located within 3 m of a pool or hot tub irrespective of voltage.

Note

Where the emergency shut off switch is GFCI protected, the emergency shut off circuit shall be connected such that tripping of the GFCI protector shall also cause the pump motor to stop.

Question 23

Is an emergency shut-off switch (stop button) for an existing public pool in a supervised location, permitted to be located inside the life guard control room or must it be located on the pool deck?

Answer 23

The OBC defines a "public pool" and classifies it to Class A and Class B pools. The OBC provides the requirements for emergency stop button location depending on classification of the pool. Refer to Article 3.11.10.1 (12) of the OBC for more information.

ESA recommends seeking advice from building officials for this question as it is an OBC direction.

6) Cord connected hydromassage bathtubs

Rule 68-302 requires electrical equipment forming an integral part of a hydromassage bathtub to be protected by a ground fault circuit interrupter of the Class A type. This Rule applies to permanently and cord connected hydromassage bathtubs.

Where a cord-connected hydromassage bathtub, spa or hot tub is intended to be installed, the requirements of Rule 68-306 shall be met.

7) Arc-fault protection (AFCI)

AFCI protection is required for an outdoor receptacle feeding pool/outdoor equipment, if:

- 1) The receptacle is located on the exterior of the dwelling unit; and
- 2) The receptacle is fed from a panel board located inside the dwelling unit.

Refer to Bulletin 26-18-* for more information.