

Bulletin 68-7-12
Swimming pool, hot tub and spa installations
Rules 12-012, 68-000, 68-056, 68-058, 68-064, 68-068, 68-302 and 68-404

Issued May 2018
Supersedes Bulletin 68-7-11

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) Bonding for pool equipment
- (3) Wiring methods
- (4) GFCI protection
- (5) Emergency shut-off switch for a public pool, spa or hot tub
- (6) Cord connected hydromassage bathtubs
- (7) AFCI protection

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 Code.

(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 of the OESC 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. 250.7-07, Extra-low-voltage landscape lighting systems, Clause 6.101.3 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 #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

10-814. 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.

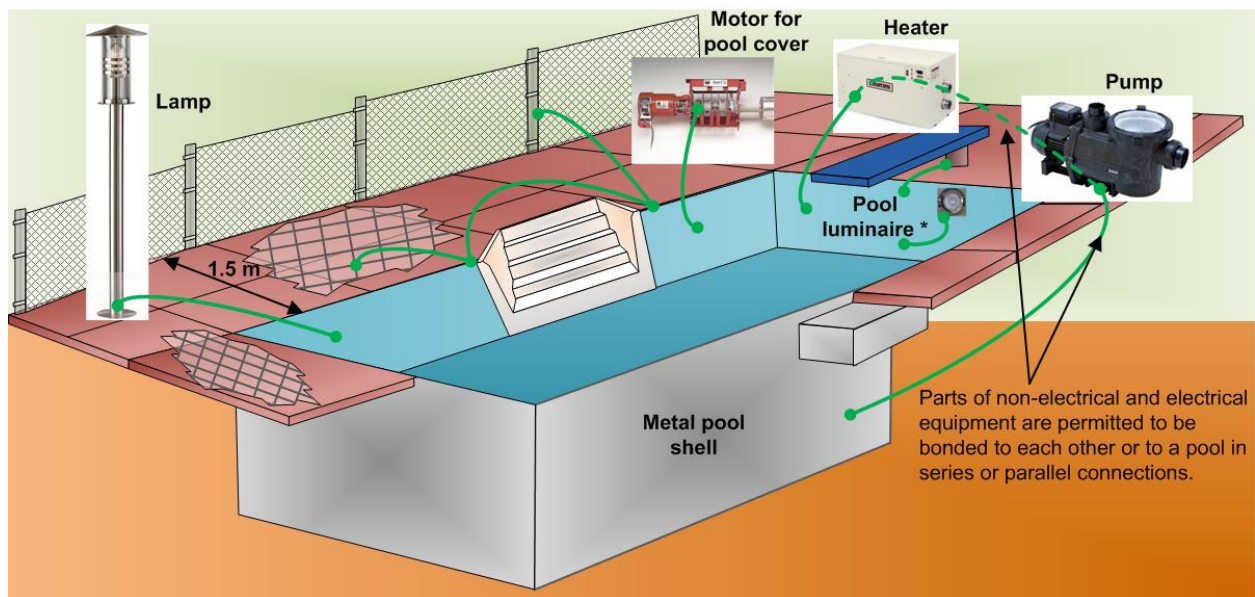
(a) Bonding for pool structures

The Code 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. fibreglass 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 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 too.

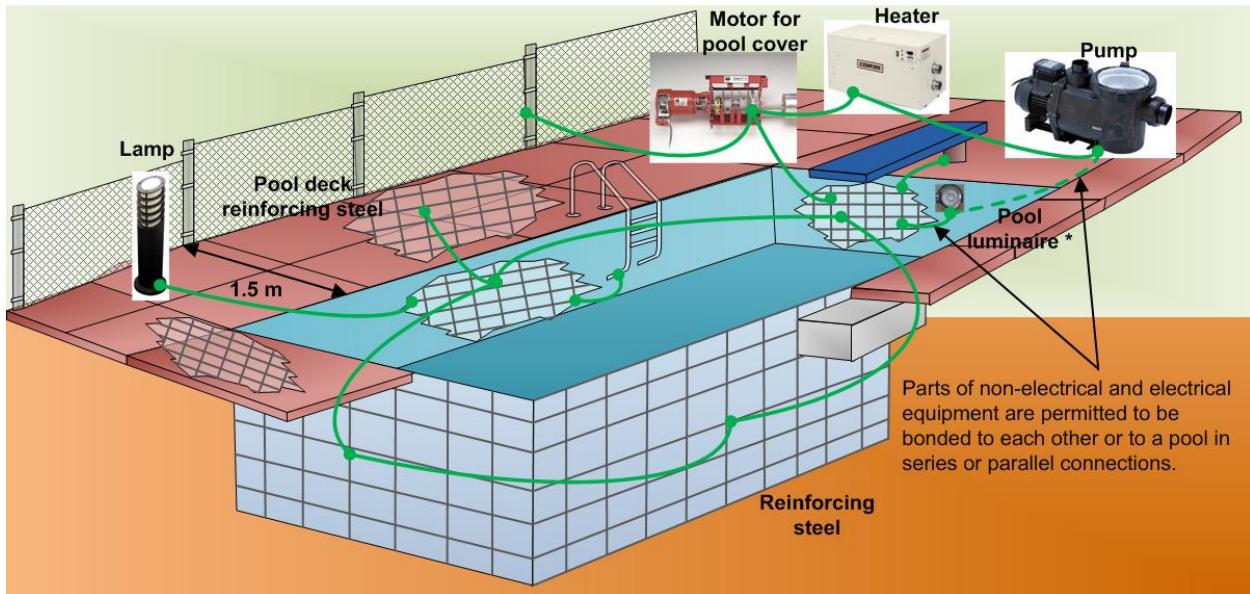
Photo B2 – Above ground pool with non-conductive supports



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.

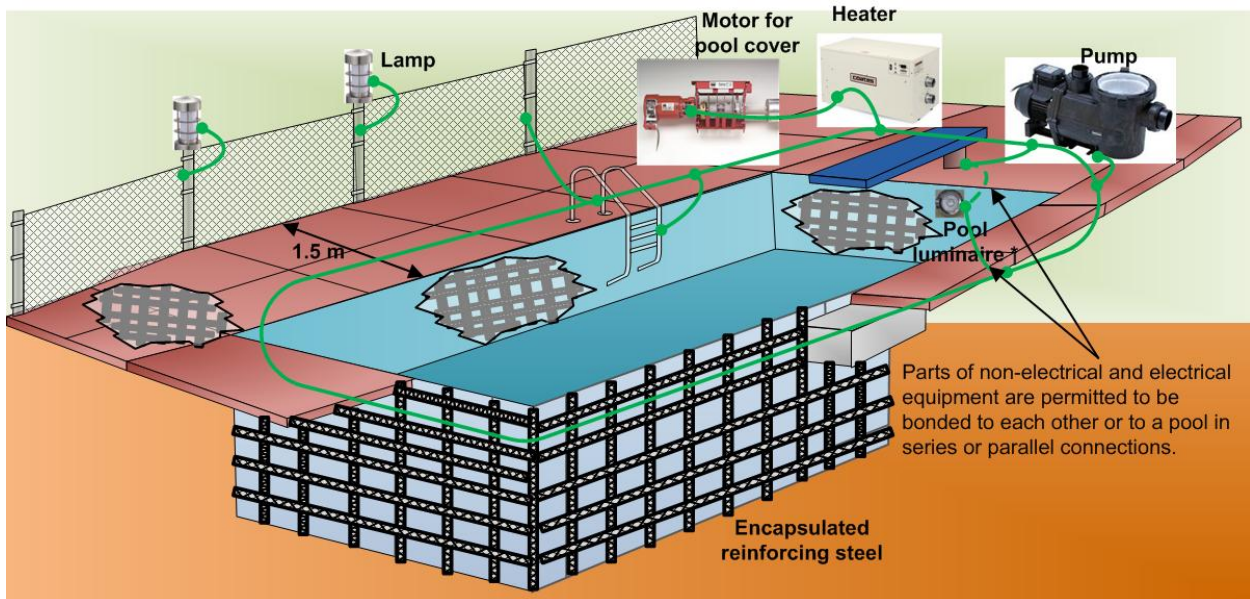
Diagram B2 – Bonding a pool with structural reinforcing steel



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 # 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 3

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

Answer 3

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 4

Does the deck reinforcing steel need to be bonded?

Answer 4

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

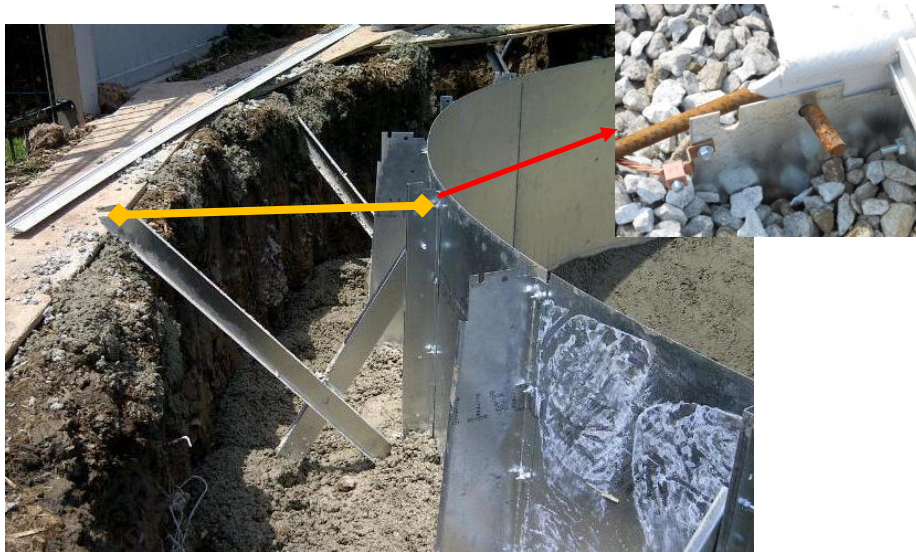


Photo B5 – A conductive mesh below the deck in solid contact with the pool



(b) 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. Prior to OESC 2009, metal pool parts were not required to be bonded to the electrical equipment, if there was no electrical equipment within 3 m of the pool.

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 5

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

Answer 5

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 6

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 the 2009 Edition of the OESC?

Answer 6

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 7

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

Answer 7

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

Question 8

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

Answer 8

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 9

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 #6 AWG bonding conductor required between the panelboard and the pool electrical equipment?

Answer 9

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 9

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 10

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

Answer 10

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 NMW or 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 its 60°C temperature rating may be lower than requirements for termination in most panelboards or pool equipment.

Question 11

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

Answer 11

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.

Question 12

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

Answer 12

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).

Question 13

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

Answer 13

Rule 68-056 applies to above ground, in-ground and other types of pools listed in Rule 68-000(2).

If the PVC raceway/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/cable is supplying non-pool related equipment, it must be kept separated from the inside walls of the pool by the distances specified in Table 61.

(4) GFCI protection

Question 14

If a pool, spa or hot tub is installed within 3 m of existing electrical equipment, does the equipment require GFCI protection? Examples are outside receptacles, lighting, central air conditioning unit, electrical revenue meter, etc.

Answer 14

Yes, Rule 68-068 requires electrical equipment that is located within the confines of the pool walls or within 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.

Question 15

If a pool pump is within 3 m of the pool, does it have to be GFCI protected?

Answer 15

Yes, Rule 68-068 requires GFCI protection of the pump that is within 3 m of the inside wall of a pool unless it 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 26-710(n) requires that receptacles of 5-15R or 5-20R configuration of residential occupancies, 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 Code 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 Code.

Rule 26-702 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

Is there any specification on this wall or barrier?

Answer 16

Rule 68-068 requires a fence, wall, or other permanent barrier. The intent is that the barrier prevents an occupant of the pool area from contacting the electrical equipment, unless it is GFCI protected.

In order to assess compliance with the Rule, a 3 m piece of string with one end held at the edge of the pool should not be able to reach the electrical equipment by going around the barrier or through a door or gate in the barrier.

The barrier should not have any openings or gaps that would permit a person to reach through and contact the equipment.

Question 17

Is it acceptable to install a GFCI Class A type outlet and not a breaker for the plug-in pump of an above-ground pool?

Answer 17

If the receptacle were further than 3 m from the pool, a GFCI Class A type outlet would be permissible.

Rule 68-064 does not permit a receptacle to be located closer than 1.5 m to the pool. Rule 68-068 does not permit the GFCI protection to be closer than 3 m to the pool.

Question 18

Where a portable (storable) pump motor is located within 1.5 m of a pool, does the Code permit the use of a GFCI Class A type receptacle next to the pump?

Answer 18

No. Rule 68-064 requires a receptacle to be located not closer than 1.5 m to the pool, however, Rule 68-068 requires the GFCI to be not closer than 3 m to the pool. The GFCI protection for the receptacle would have to be located further than 3 m from the pool.

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 B6, require ground fault circuit interruption?

Photo B6 – 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.

(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 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 21

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

Answer 21

Yes, Rule 68-068(7) requires GFCI protection for the emergency shut-off switch, located within 3 m of a pool or 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 22

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 22

The Ontario Building Code (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 Ontario Building Code issue.

(6) Cord connected hydromassage bathtubs

OESC 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 Code 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) AFCI protection

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

- 1) The receptacle is located on a dwelling unit; or
- 2) The receptacle is fed from a panel board located inside a dwelling unit.

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