



LIFESAVING SOCIETY®  
SOCIÉTÉ DE SAUVETAGE

*The Lifeguarding Experts*  
*Les experts en surveillance aquatique*

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## Safety Standards for Canadian Swimming Pools and Waterfronts Aquatic Facility Standard

### Hyperventilation and Extended Breath-Holding Standard

#### Standard

The practice of hyperventilation or extended breath-holding should only be permitted under the direct supervision of a qualified instructor or coach who is following recognized safety protocols for aquatic sports such as underwater hockey, artistic swimming, static or dynamic apnea, free diving, Lifesaving Sport, etc.

#### Definitions

**Direct supervision:** maintaining continual eye contact on deck and in water; able to alert lifeguards.

**Dynamic apnea-** breath held dives where the diver travels in a horizontal position under water under their own power without aid or physical contact with a static surface (with the exception of the swimming pool wall).

**Freediving:** a form of underwater diving that relies on breath-holding until resurfacing rather than the use of breathing apparatus' such as scuba gear.

**Hyperventilation:** occurs when the rate or tidal volume of breathing eliminates more carbon dioxide than the body can produce. This leads to hypocapnia, a reduced concentration of carbon dioxide dissolved in the blood. This can lead to dizziness, headache, weakness, fainting, and seizures.

**Hypoxic blackout:** (previously known as 'shallow water blackout') a loss of consciousness due to lack of oxygen from breath holding or purposeful hyperventilation before submersion.

**Static apnea:** a discipline in which a person holds their breath underwater for as long as possible without swimming any distances.

## Rationale

- There have been several drownings in Canada as a result of bathers attempting underwater swims while holding their breath (static and dynamic apnea).
- Besides the limits of breath-holding, immersion in water and exposure to high pressure changes also have physiological effects that limit the depths and duration possible in freediving.
- Although the activity of breath-holding is gaining in popularity in competition formats, typical recreational swims are not set up to provide adequate supervision and response to this type of activity.
- There are guidelines that dictate recommended supervision and prevention strategies for breath-holding competitions.
- The *Canadian Lifesaving Manual* warns about the dangers of breath-holding.
- Significant research found overwhelming evidence that without proper training and supervision, extended breath-holding is dangerous and may lead to unconsciousness and drowning.
- Hyperventilation is a series of deep breaths followed by forced exhalation prior to breath-holding in an attempt to remain underwater for a longer period of time. This decreases the level of CO<sub>2</sub> in the blood which is responsible for triggering the need to breathe.

With less CO<sub>2</sub> a swimmer will not feel an urge to take a breath as quickly and can remain under water longer. This however, does not mean that the swimmer does not need oxygen. Oxygen levels are being used and can be depleted more quickly if the person is moving or swimming rather than remaining stationary.

If oxygen levels in the blood drop sufficiently enough before CO<sub>2</sub> levels trigger the need to breathe, the swimmer will become unconscious. An unconscious swimmer will breathe water into their lungs and will drown if not rescued and resuscitated.

## Implementation

The Lifesaving Society recommends that every aquatic facility implement a policy related to hyperventilation and extended breath-holding. Operators and clubs should include this policy in their facility policy and procedures manual and ensure staff are trained in the recognition, prevention and treatment of hypoxic blackout. Signage should also be posted advising the public of this 'no extended breath holding' policy.

The practice of extended breath-holding should only be permitted under the direct supervision of a qualified instructor or coach who has received training in appropriate extended breath-holding safety protocols.

## References

- ABC News, David Blaine: 'Drowned' Alive
- AIDA Canada, [www.aidacanada.org](http://www.aidacanada.org)
- American Red Cross, Safety Training for Swim Coaches, 1996
- American Red Cross, Swimming and Water Safety, 2004
- Aquatics International, Playing it Safe, Tom Griffiths, May 2004.

- Association Internationale Pour Le Developpment De L'Apnee, [www. aida-international.org](http://www.aida-international.org)
- Athletic Business, Game On – Don't Hold Your Breath, Paul Steinbach, Jan 2007
- Confederation Mondiale des activites subaquatiques, [www.cmas.org](http://www.cmas.org)
- Dying for Air, International Aquatics Magazine, Feb 2005
- *Judith Sperling, UCLA Recreation*, HYPERVENTILATION & HYPOXIC TRAINING, April 07th, 2011, <http://www.nirsa.info/know/2007/12/risk001.html>
- Shallow Water Blackout video, Dr. Tom Griffiths.
- Swimming Canada, Shallow Water Blackout, December 2018
- Swimming Technique, Lowdown on Hypoxic Training, Kevin Milak, Jul-Sep 2003.
- Talisman Safety Policy and Procedure Manual
- U.S. Navy, BUPERINST 1710.11C, Chapter 15 Aquatic Programs and Facilities, 1523. Hyperventilation and Breath-Holding.
- USA Swimming, Safety/Loss Control Manual, Nov 2005.
- USA Swimming, Speedo Tip of the Week, Freestyle Breathing Mechanics, Terry Laughlin, Nov 15, 2004.
- YMCA, Statement of the YMCA of the USA Medical Advisory Committee, Jan 2004

### Approval

- Approved by the Lifesaving Society Canada Board of Directors on 8 May 2016.
- Revised and approved by Lifesaving Society Canada's Board of Directors on 8 March 2021.
- Revised and approved by Lifesaving Society Canada's Board of Directors on 14 June 2022.

### Disclaimer

Lifesaving Society Canada's National Safety Standards are developed using Coroners' recommendations, the latest evidence-based research, and reflect the aquatic industry's best practices at the time the publication was approved or revised.

The purpose of these standards is to encourage swimming pool, waterpark and waterfront owners, managers, operators and regulators to adopt these standards in order to prevent drownings in aquatic environments.

Lifesaving Society Canada's National Safety Standards do not replace or supersede local, provincial/territorial or federal legislation or regulations, but they are considered the standard to which aquatic facility operators should work towards in order to enhance safety within their operations and to prevent drowning and aquatic-related injury.