



**Bureau de normalisation  
du Québec**

**BNQ 9461-100/2009  
(R 2021)**

**Residential Swimming Pools Equipped  
with a Diving Board — Minimum Water  
Envelope to Prevent Cervical Spinal  
Cord Injuries Resulting from Diving  
from a Diving Board**

**STANDARD**



BNQ 9461-100/2009  
(R 2021)

Residential Swimming Pools Equipped with a Diving Board —  
Minimum Water Envelope to Prevent Cervical Spinal Cord Injuries  
Resulting from Diving from a Diving Board

*Piscines résidentielles dotées d'un plongoir — Enveloppe d'eau minimale pour prévenir  
les blessures médullaires cervicales résultant d'un plongeon  
effectué à partir d'un plongoir*



## **Bureau de normalisation du Québec**

The Bureau de normalisation du Québec (BNQ) is a standardization organization based in Quebec and created in 1961. It is one of the standards development organizations accredited by the Standards Council of Canada (SCC) and as such, is part of the National Standards System.

As an administrative unit of Investissement Québec (IQ), the BNQ produces standards that meet the needs of the industry, of public and para-public organizations, and of concerned groups.

**SECOND EDITION — 2021-07-05**

This is a reaffirmation (reapproval) of the edition dated May 25, 2009.

This document is published in both French and English. In case of incompatibility, the French version prevails.

The decision resulting from the systematic review that will enable to determine whether the current document shall be modified, revised, reaffirmed or withdrawn will be implemented no later than at the end of July 2025.

**ICS: 97.220.10.**

ISBN 978-2-551-26686-9 (printed version)  
ISBN 978-2-551-26687-6 (PDF)

Legal deposit — Bibliothèque et Archives  
nationales du Québec, 2021

## **REQUEST FOR INFORMATION AND PURCHASE**

Any request for information or purchase of this document may be sent to the Bureau de normalisation du Québec (BNQ) at:

333, rue Franquet, Québec, Québec G1P 4C7

[telephone: 418-652-2238, ext. 2437 or 1-800-386-5114; fax: 418-652-2292;

email: [bnqinfo@bnq.qc.ca](mailto:bnqinfo@bnq.qc.ca); website: [www.bnq.qc.ca](http://www.bnq.qc.ca)].

## **REVISION OF BNQ DOCUMENTS**

Collaboration from BNQ document users is essential in keeping our documents up to date. Therefore, any suggestion aimed at improving their contents will be appreciated. We ask you to send us your suggestions or comments on the form at the end of this document.

The electronic or printed version of this document is for personal use only. Distribution to third parties, partners or clients, as well as saving, distribution or use on a computer network is forbidden without written agreement from the BNQ.

Only purchasers duly registered with BNQ Customer Service will receive document updates. Notifications and the catalogue may be consulted at all times on the BNQ's website [[www.bnq.qc.ca](http://www.bnq.qc.ca)] to verify if a more recent version of a document exists or if amendments or errata have been published.

If a registered purchaser wishes to continue to receive updates, the purchaser must inform BNQ Customer Service of any change of address as soon as possible.

© BNQ, 2021

All rights reserved. Unless otherwise specified, no part of this document may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilming, without written permission from the BNQ.

## **NOTICE**

### **UNDERSTANDING OF THE NOTION OF EDITIO**

It is important to note that this edition implicitly includes all amendments and errata that might be published separately at a later date. It is the responsibility of the users of this document to verify whether any amendments or errata exist.

### **INTERPRETATION**

The verb **shall** is used to express a requirement (mandatory) in order to comply with this document.

The verb **should**, or the equivalent expressions **it is recommended that** and **ought to**, is used to indicate a useful, but not mandatory, suggestion or to indicate the most appropriate means of complying with this document.

Except for notes presented as **normative notes**, which set out mandatory requirements and which appear in the lower portion of figures and tables only, all other **notes** are **informative** (non-mandatory) and provide useful information intended to facilitate understanding or clarify the intent of a requirement or to add clarification or further details.

**Normative annexes** provide additional requirements (mandatory) in order to comply with this document.

**Informative annexes** provide additional (non-mandatory) information intended to assist in the understanding or use of elements of this document or to clarify its implementation. They contain no mandatory requirements for the purpose of compliance with this document.

### **DISCLAIMER OF RESPONSIBILITY**

This document was developed as a reference document for voluntary use. It is the user's responsibility to verify whether the application of this document is mandatory under the applicable legislation or regulations or whether trade regulations or market conditions stipulate its use in, for example, technical regulations, inspection plans originating from regulatory authorities and certification programs. It is also the responsibility of the users to consider limitations and restrictions specified in the Purpose and Scope and to judge the suitability of this document for the user's purposes.

### **MARKING AND LABELLING REQUIREMENTS**

This document may contain requirements for marking and/or labelling. In this event, in addition to meeting such requirements, it is also the responsibility of the suppliers of products to comply with the applicable national, provincial or territorial laws and regulations of the jurisdictions in which the products are distributed.





## FOREWORD

This document was developed in compliance with the Standards Council of Canada (SCC)'s Requirements and Guidance for standards development organizations. Its reaffirmation was approved by a Standards Development Committee, whose members were:

### **Suppliers**

MOINEAU, Martin	AquaFab
PAQUETTE, Anne Marie Laurence	Association des commerçants de piscines du Québec (ACPQ)
PERRAS, Isabelle	Piscines Fontaine
TURCOTTE, Guillaume	SCP Distributors

### **Users**

HAWKINS, Raynald	Société de sauvetage
LAVOIE, Éric	
VACHON, Sandra	Corporation des officiers municipaux en bâtiment et en environnement du Québec (COMBEQ)
ZELAYA, Walter	Moelle épinière et motricité Québec (MEMO-QC)

### **General Interest**

BOUCHER, Jean-Sébastien	Ministère de la Santé et des Services sociaux (MSSS)
BOULANGER, Dany	Plongeon Québec
BRISSON, Ghislain	Ministère des Affaires municipales et de l'Habitation (MAMH)

FOURNIER, Christine

Centre de réadaptation en déficience physique — Installation Saint-Hubert, Centre intégré de santé et de services sociaux de la Montérégie-Ouest (CRDP Saint-Hubert, CISSMO)

**Coordination**

CORREIA MOREAU, Elisabeth  
(Standards Developer)\*

Bureau de normalisation du Québec (BNQ)

---

\* At the time of publication of this document, the aforementioned person no longer worked for the Bureau de normalisation du Québec.

The 2009 edition of this document was prepared by a Standards Development Committee, whose members were:

BEAUDRY, André	Latham Splash Canada
BOULANGER, Dany	Université Laval
DEMEULE, Carole	Industries SCP
HAWKINS, Raynald	Société de sauvetage
LAVOIE, Éric	Société pour la prévention des accidents de plongeon
LEDUC, Bernard-E.	Institut de réadaptation Gingras-Lindsay de Montréal (IRGLM)
PATRY, Pierre	Ministère de la Santé et des Services sociaux — Direction générale de la santé publique (MSSS-DGSP)
PERRAS, Isabelle	Association des commerçants de piscines du Québec (ACPQ)
RATTÉ, Claude	Corporation des officiers municipaux en bâtiment et en environnement du Québec (COMBEQ)
RÉGIMBALD, Sylvie	Ministère des Affaires municipales, des Régions et de l'Occupation du territoire (MAMROT)
TREMBLAY, Michel	Union des municipalités du Québec (UMQ)
LANGLAIS, Daniel (coordinator)	Bureau de normalisation du Québec (BNQ)

The participation of the following people is also worthy of mention:

LAVERGNE, Isabelle	Association des responsables d'activités aquatiques du Québec (ARAQ)
LUSSIER, Claude	Ministère des Affaires municipales, des Régions et de l'Occupation du territoire (MAMROT)

The development of this standard was made possible thanks to the financial support of the following organizations: Société de sauvetage, Ministère de la Santé et des Services sociaux (MSSS), Ministère de l'Éducation, du Loisir et du Sport (MELS), Ministère des Affaires municipales, des Régions et de l'Occupation du territoire (MAMROT) and Ministère du Développement économique, de l'Innovation et de l'Exportation (MDEIE).

## CONTENTS

	<b>Page</b>	
1	SCOPE	1
2	PURPOSE	1
3	NORMATIVE REFERENCE	1
4	DEFINITIONS	2
5	GENERAL REQUIREMENTS	2
	5.1 LAWS AND REGULATIONS	2
	5.2 OTHER APPLICABLE STANDARDS	2
6	DIMENSIONS AND GEOMETRIC PROPERTIES OF SWIMMING POOLS	3
	6.1 DIMENSIONS REFERENCES	3
	6.2 HEIGHT OF THE DIVING BOARD	3
	6.3 DIMENSIONS OF THE WATER ENVELOPE	3
	6.4 CLEARANCE FOR OTHER EQUIPMENT AND ACCESSORIES	4
	6.5 CLEARANCE BETWEEN DIVING BOARDS	4
	6.6 CLEARANCE ABOVE DIVING BOARDS	4
	6.7 LIGHTING	5
7	DIVING BOARD REQUIREMENTS	5
	7.1 STRUCTURAL INTEGRITY	5
	7.2 SURFACES	5
	7.3 DIMENSIONS	5
	7.4 DIVING BOARD WITH SPRING	5
8	MEASUREMENT OF DIMENSIONS	5
	8.1 HEIGHT <i>H</i> OF THE DIVING BOARD	5
	8.2 WATER DEPTHS	5
	8.3 SLOPES AND INCLINES	6
	8.4 CLEARANCES ABOVE A DIVING BOARD	6
9	PLANS AND SPECIFICATIONS	6
	9.1 GENERAL	6
	9.2 INFORMATION TO BE PROVIDED	6
	9.3 LOGOS	7

ANNEX A —	DIMENSIONS AND GEOMETRIC REQUIREMENTS OF THE WATER ENVELOPE FOR SWIMMING POOLS EQUIPPED WITH A DIVING BOARD WITH HEIGHT $H \leq 0,50$ M	8
TABLE A.1 —	MINIMUM DIMENSIONS AND GEOMETRIC REQUIREMENTS OF THE WATER ENVELOPE	8
FIGURE A.1 —	WATER ENVELOPE DIAGRAM	9
TABLE A.2 —	MINIMUM CLEARANCES ABOVE THE DIVING BOARD	10
FIGURE A.2 —	DIAGRAM OF CLEARANCES ABOVE THE DIVING BOARD	10
ANNEX B —	EXAMPLE OF APPLYING THE CLEARANCE REQUIREMENTS WITH OTHER EQUIPMENT AND ACCESSORIES	11
ANNEX C —	3-DIMENSIONAL DIAGRAM OF MINIMUM DIMENSIONS IN TABLE A.1	12
ANNEX D —	FINA FACILITIES RULES 2005-2009 — FINA FR 5 DIVING FACILITIES	13
FIGURE D.1 —	DIVING FACILITIES DIAGRAM	14
ANNEX E —	THE CONCEPT OF SAFETY	15
ANNEX F —	TABLE OF RATIONALES — DIMENSIONS REQUIRED IN STANDARD BNQ 9461-100 <i>RESIDENTIAL SWIMMING POOLS EQUIPPED WITH A DIVING BOARD — MINIMUM WATER ENVELOPE TO PREVENT CERVICAL SPINAL CORD INJURIES RESULTING FROM DIVING FROM A DIVING BOARD</i>	16
ANNEX G —	INFORMATIVE REFERENCES	24
ANNEX H —	BIBLIOGRAPHY	25

## **INTRODUCTION**

### Origin of the standard

Over the years, a number of accidents causing cervical spinal cord injury following a dive from a springboard in a residential in-ground swimming pool have been brought to the attention of the Lifesaving Society. These diving accidents have left victims quadriplegic. Some of the pools in which the accidents occurred met the ANSI/NSPI-5 Standard requirements (see Annex G). The *Éric Lavoie v. Perras* Judgment of January 8, 2004 in the Québec Court of Appeal called for a revision of the standards for swimming pools equipped with a springboard. Following *Éric Lavoie's* actions, a feasibility study was conducted by the Bureau de normalisation du Québec (BNQ) in 2006 to examine the relevance of developing a standard to prevent spinal cord injury and to assess the interests of stakeholders.

In order to prevent spinal cord injury by providing a safe environment to practice recreational diving from a diving board in a residential setting, the Lifesaving Society, the Direction de la promotion de la sécurité of the Ministère de l'Éducation, du Loisir et du Sport (MELS), the Direction générale de la santé publique of the Ministère de la Santé et des Services sociaux (MSSS) and the Ministère des Affaires municipales, des Régions et de l'Occupation du territoire (MAMROT) asked the BNQ to develop a standard on geometric requirements and minimum dimensions for private residential swimming pools with a diving board intended for the safe practice of recreational and occasional diving in a residential setting.

### Impact of cervical spinal cord injury

The magnitude of the problem becomes apparent when one considers the scope of its consequences. Cervical spinal cord injuries are at the top of the injury severity scale. In Canada, there are four accidents per year related to residential pools with a diving board that leave the victim a quadriplegic following a dive from a springboard, including one such accident in Quebec. The victims are most often men between 15 and 44 years of age at the time of the accident. In most cases, the diver's head hits the transition upslope between the deep and shallow ends of the pool.

Quadriplegia resulting from a springboard accident significantly diminishes the quality of life of the victim and his or her family, both socially and economically. According to the literature, for each diving-accident victim, the direct costs to the health system and society are assessed between 240 000 \$ and 460 000 \$ for the first year and about 52 000 \$ for each subsequent year — not to mention indirect costs in the same order of magnitude, due to loss of income and

loss of productivity. In Québec, patients with cervical spinal cord injuries are hospitalized for an average of 125 days (acute care and rehabilitation care) following the injury.

#### Part of the solution

The purpose of this standard is to help reduce the likelihood that such diving accidents will occur. This standard is based on the pooling of technical and empirical knowledge about the practice of diving adapted to the context of occasional recreational diving from springboards of residential pools, along with the experience and knowledge acquired by experts as part of technical and scientific work or from years of working as a diving coach, and the result of many years of applying technical specifications such as the FINA Document FR 5 and the ANSI/NSPI-5 Standard (see Annex G) on a broad scale.

This standard does not aim to cover every aspect of a comprehensive approach to the prevention of water-related injuries. It is intended to cover the factors related to equipment contributing to the prevention of cervical spinal cord injury when diving from a springboard. This standard is a reference document that can be used in initiatives aimed at raising public awareness and as a complement to other prevention strategies relating to personal and environmental risk factors.



## **RESIDENTIAL SWIMMING POOLS EQUIPPED WITH A DIVING BOARD — MINIMUM WATER ENVELOPE TO PREVENT CERVICAL SPINAL CORD INJURIES RESULTING FROM DIVING FROM A DIVING BOARD**

### **1**        **SCOPE**

This standard specifies the dimensional, geometric and physical properties with which the water envelope surrounding a diving board in a residential swimming pool, diving boards and out-of-water clearances shall comply to provide a safe environment for the practice of recreational diving from a diving board in a residential setting, in order to prevent cervical spinal cord injury.

**NOTE** — This standard does not cover all aspects of swimming pool safety such as injuries other than cervical spinal cord injuries resulting from diving from a diving board, or diving from the edge of a pool, the layout of the swimming pool, the restriction of access to the swimming pool, circulation and water treatment equipment, the risk of entrapment in the equipment and accessories, and the general features of swimming pool use. Furthermore, this standard is not a best practices guide for using a swimming pool or a diving board.

### **2**        **PURPOSE**

This standard applies to residential swimming pools with one or more diving boards.

### **3**        **NORMATIVE REFERENCE**

The reference below (including any amendment or errata) is a normative reference, and is therefore considered mandatory. It is essential to the understanding and use of this document, and are cited in appropriate places in the text.

It should be noted that a dated normative reference refers to that specific edition of the reference, while a non-dated normative reference refers to the latest edition of the reference in question.

**NOTE** — This document also cites informative references, which are listed in an Annex. A bibliography of references on topics covered in this document is also annexed.