

NZS 5826:2010



New Zealand Standard

Pool Water Quality

Superseding NZS 5826:2000

NZS 5826:2010



This is a preview. [Click here to purchase the full publication.](#)

COMMITTEE REPRESENTATION

This Standard was prepared under the supervision of the P 5826 Committee the Standards Council established under the Standards Act 1988.

The committee consisted of representatives of the following:

Nominating Organisation

Community Leisure Management
Institution of Professional Engineers New Zealand
Institute of Environmental Science & Research Ltd
Local Government New Zealand
Ministry of Education
Ministry of Health
New Zealand Chemical Industry Council Inc.
New Zealand Master Pool Builders Incorporated
New Zealand Principals' Federation
New Zealand Recreation Association
Water New Zealand
Water Safety New Zealand

ACKNOWLEDGEMENT

Standards New Zealand gratefully acknowledges the contribution of time and expertise from all those involved in developing this Standard.

Cover photo courtesy of Opus International Consultants Ltd and Wellington City Council.

COPYRIGHT

The copyright of this document is the property of the Standards Council. No part of the text may be reproduced by photocopying or by any other means without the prior written approval of the Chief Executive Officer of Standards New Zealand unless the circumstances are covered by Part III of the Copyright Act 1994.

Standards New Zealand will vigorously defend the copyright in this Standard. Every person who breaches Standards New Zealand's copyright may be liable to a fine not exceeding \$50,000 or to imprisonment for a term not to exceed three months. If there has been a flagrant breach of copyright, Standards New Zealand may also seek additional damages from the infringing party, in addition to obtaining injunctive relief and an account of profits.

Published by Standards New Zealand, the trading arm of the Standards Council, Private Bag 2439, Wellington 6140. Telephone; (04) 498 5990, Fax; (04) 498 5994, Website; <http://www.standards.co.nz>.

AMENDMENTS

No.	Date of issue	Description	Entered by, and date

New Zealand Standard

Pool water quality

Superseding NZS 5826:2000

ISBN 978-1-86975-133-3

NOTES

CONTENTS

Committee representation.....	IFC
Acknowledgement.....	IFC
Copyright.....	IFC
Referenced documents.....	6
Latest revisions	7
Review of Standards	7
Foreword	8
Outcome statement.....	8
 PART 1 POOL WATER QUALITY.....	 9
1.1 Scope, objectives, and interpretation	9
1.2 Definitions and glossary of terms.....	10
1.3 Water treatment.....	16
1.4 Water quality criteria and testing frequencies.....	18
1.5 Additional requirements for spa pools and hot tubs	23
1.6 Specific requirements for geothermal pools	24
 PART 2 POOL RISK MANAGEMENT PLAN GUIDES	 26
2.1 Introduction	26
2.2 Risk management guide – General monitoring	29
2.3 Risk management guide – Staff training.....	36
2.4 Risk management guide – Media filtration without floculation	40
2.5 Risk management guide – Media filtration with floculation.....	43
2.6 Risk management guide – Pre-coat filtration.....	47
2.7 Risk management guide – Chlorine disinfection	51
2.8 Risk management guide – Chlorine dioxide disinfection	62
2.9 Risk management guide – Ozone disinfection	73
2.10 Risk management guide – Disinfection by ultraviolet irradiation	78
2.11 Risk management guide – pH adjustment.....	83
2.12 Risk management guide – Pump operation.....	90
2.13 Risk management guide – Alternative treatment systems.....	97
 Appendix	
A Health considerations (Normative)	98
B Coagulation and flocculation (Informative)	105
C Chemical principles for chlorinated pools (Informative).....	107
D Alternatives to chlorine for pool disinfection (Informative)	111
E Chemical dosing procedures (Informative).....	115
F Safe handling, storage, and management of chemicals (Informative).....	118
G Checklist of duties and procedures for safe operation of swimming pools (Informative)	119

H	Water quality test procedures, test kits, and equipment (Informative)	128
J	Troubleshooting (Informative)	146
K	Estimating risk (Informative)	148

Table

1	Chemical water quality criteria – Swimming pools and spa pools.....	19
2	Minimum frequency of chemical testing for swimming pools	21
3	Minimum frequency of chemical testing for spa pools.....	21
4	Microbiological water quality criteria.....	22
5	Risk information – Incorrect data used for pool management.....	31
6	Event indicators and contingency actions – Quality of monitoring.....	34
7	Pool data monitoring data.....	35
8	Risk information – Inadequate knowledge.....	37
9	Inadequate training consequences.....	38
10	Risk information – Particulate pollution not removed without flocculation	41
11	Event indicators and contingency actions	41
12	Media filtration without flocculation assessment	42
13	Risk information – Particulate pollution not removed with flocculation	44
14	Event indicators and contingency actions	45
15	Filtration with flocculation assessment	46
16	Risk information – Particulate pollution not removed with pre-coat filtration	48
17	Event indicators and contingency actions	49
18	Pre-coat media filtration assessment	50
19	Risk information – Microorganisms introduced during pool use	52
20	Risk information – Insufficient free available chlorine (inadequate disinfection).....	53
21	Risk information – Too much free available chlorine.....	57
22	Risk information – Excessive formation of chloramines/ disinfection by-products.....	59
23	Event indicators and contingency actions – Lower FAC.....	60
24	Event indicators and contingency actions – Higher FAC.....	60
25	Chlorination assessment	61
26	Risk information table – Chlorine dioxide (ClO ₂) concentration too low.....	64
27	Risk information table – Chlorine dioxide (ClO ₂) concentration too high	67
28	Risk information table – Excessive formation of by-products.....	69
29	Risk information table – ClO ₂ concentration low	70
30	Risk information table – ClO ₂ concentration high	71
31	Risk information table – High chlorate or chlorite concentrations	71
32	Chlorine dioxide assesment	72

33	Risk information – Low ozone level in treatment stage	75
34	Event indicators and contingency actions	76
35	Ozonation assesment	77
36	Risk information – Low UV level	80
37	Event indicators and contingency actions	81
38	UV disinfection assesment	82
39	Risk information – High pH level.....	84
40	Risk information – Low pH level	86
41	Risk information – Introduction of microorganisms during pool use	86
42	Event indicators and contingency actions – High pH	87
43	Event indicators and contingency actions – Low pH	88
44	pH level assessment.....	89
45	Pump types and applications.....	90
46	Risk information – Water flow changes or pressure surges	92
47	Risk information – Incorrect chemical dosing.....	93
48	Event indicators and contingency actions – Poor quality control	94
49	Event indicators and contingency actions – Pump failure	95
50	Pump performance assessment.....	96
A1	Risk assessment for diarrhoeal incidents.....	100
A2	Guideline contact times and dose rates to inactivate Giardia and Cryptosporidium	102
G1	Sample notice for filter plant and pool details.....	121
H1	Alkalinity x hardness products above which calcium carbonate scaling and precipitation can occur	140
H2	Typical changes in pH and alkalinity expected when chemicals are added.....	141
J1	Troubleshooting.....	146
K1	Risk likelihood ranking scale.....	149
K2	Consequence criteria scale	149
K3	Example of a probability criteria matrix	150
K4	Example of a risk ranking matrix	150
K5	Example of a probability criteria matrix using risk ranking	150

Figure

1	Impact of pH value on disinfection capability	88
H1	Watergram for determining the chemical balance of water	138
H2	Watergram for the example calculation in H9.4.....	139
H3	An example of a swimming pool test sheet	145
K1	Risk management process	148

REFERENCED DOCUMENTS

Reference is made in this document to the following:

NEW ZEALAND STANDARD

NZS 4441:2008 Swimming pool design Standard

JOINT AUSTRALIAN/NEW ZEALAND STANDARDS

AS/NZS 2927:2001 The storage and handling of liquefied chlorine gas
AS/NZS ISO 31000: Risk management – Principles and guidelines
2009
AS/NZS 4276:- - - Water microbiology

AUSTRALIAN STANDARD

AS 3633:1989 Private swimming pools – Water quality

INTERNATIONAL STANDARD

ISO/IEC 31010:2009 Risk management – Risk assessment techniques

OTHER PUBLICATIONS

American Public Health Association (APHA): *Standard methods for the examination of water and wastewater*, 21st edition.

Korich D G, Mead J R, Madore M S, Sinclair N A, Sterling C R. 'Effects of ozone, chlorine dioxide, chlorine, and monochloramine on *Cryptosporidium parvum* oocyst viability'. *Applied Environmental Microbiology* 1990 May; 56(5): 1423–1428.

Ministry of Health. *Drinking-water standards for New Zealand 2005* (revised 2008).

World Health Organization: *Guidelines for safe recreational waters Volume 2 – Swimming pools and similar recreational-water environments*, 2006, ISBN 92-4-154680-8

NEW ZEALAND LEGISLATION

Local Government Act 2002
Hazardous Substances and New Organisms (HSNO) Act 1996
Health and Safety in Employment (HSE) Act 2005

RELATED DOCUMENT

Although not referenced in this Standard the following document also contains helpful information:

United States Environmental Protection Agency (USEPA): National Primary Drinking Water Regulations: Long Term 2 Enhanced Surface Water Treatment Rule: Final Rule. <http://www.epa.gov/fedrgstr/EPA-WATER/2006/January/Day-05/w04b.pdf>

WEBSITES

<http://www.legislation.govt.nz>
<http://www.erma.govt.nz>
<http://www.osh.dol.govt.nz>

LATEST REVISIONS

The users of this Standard should ensure that their copies of the above-mentioned New Zealand Standards are the latest revisions. Amendments to referenced New Zealand and Joint Australian/New Zealand Standards can be found on <http://www.standards.co.nz>

REVIEW OF STANDARDS

Suggestions for improvement of this Standard will be welcomed. They should be sent to the Chief Executive, Standards New Zealand, Private Bag 2439, Wellington 6140.

FOREWORD

This New Zealand Standard was prepared by the Standards New Zealand Technical Committee P 5826 Pool Water Quality, at the request of Local Government New Zealand, to update NZS 5826:2000 *Pool water quality*.

As an important public health Standard, this edition has been substantially revised and updated to reflect current knowledge, technology, and processes. This Standard is intended to be used by all pool owners and pool managers, and consists of two Parts:

- (a) Part 1 contains water quality parameters to meet in order to claim compliance with the Standard;
- (b) Part 2 incorporates a major change with the provision of guidance on the application of risk management principles to water quality and general pool management. This material may be used by a pool owner or pool manager to prepare a tailored pool risk management plan (PRMP), which will identify potential harmful events impacting on water quality, and indicate solutions.

The requirement in the Standard that pools have water quality risk management plans in operation is new. All public pools shall have risk management plans in place, and domestic pool owners should operate their pools in accordance with these principles.

Risk management plans ensure that swimming pools are operated as safely as possible, in order that the largest possible number of users benefits from these recreational water environments. Risk management principles and plans will be helpful to all pool owners and pool operators in understanding general pool management and maintenance, and should help pool managers ensure compliance and drive cost savings by taking all practicable steps, in proportion to the assessed risk, to eliminate, isolate, or minimise each risk to water quality.

Users of this Standard are reminded that it has no legal authority in its own right, but acquires legal standing when cited or referenced in legislation, or adopted by the Government or other authority having jurisdiction.

OUTCOME STATEMENT

This Standard will, through identification of all practicable steps, assist pool owners and pool managers to meet their responsibilities for public safety by providing robust and efficient pool water quality management systems that ensure that the water used in pools is maintained to safeguard health.