

SOUTH AUSTRALIAN HEALTH COMMISSION CODE

STANDARD

FOR THE

Operation of Swimming Pools and Spa Pools in South Australia

SUPPLEMENT B

HYDROTHERAPY POOLS

DEPARTMENT OF HUMAN SERVICES

(SOUTH AUSTRALIAN HEALTH COMMISSION)



**Government
of South Australia**

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SUPPLEMENT B ~ Hydrotherapy pools

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This guideline is one of a series of guidelines to assist Local Government in the administration of the Public and Environmental Health Act and Regulations.

Should you wish to comment on the information in this guideline, your written comments are welcome and should be addressed to:

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FOREWORD

Under the Public and Environmental Health Act, the Public and Environmental Health Council can initiate measures to promote public and environmental health standards and has the responsibility to keep the operation and administration of the Act under review.

To assist local councils in the administration of the legislation the Public and Environmental Health Council has requested that “Supplement B” to the code “Standard for the Operation of Swimming Pools and Spa Pools in South Australia” be prepared taking into account the provisions of Section 47(5) of the Act and Regulations 3 and 6(1) as it relates to hydrotherapy pools. For the purpose of Regulation 3, a hydrotherapy pool is included within the definition of a swimming pool.

“Supplement B” to the code “Standard for the Operation of Swimming Pools and Spa Pools in South Australia” has been prepared to address the issue of water quality in relation to the operation of a hydrotherapy pool. It details measures necessary to ensure that water quality within a hydrotherapy pool is of a standard that does not prejudice the health or well being of hydrotherapy pool users.

It describes in detail the disinfection of hydrotherapy pool water with reference to other important parameters such as pH, water clarity, total alkalinity and water turnover rates that need to be maintained in balance as part of the total water treatment process.

This supplement is aimed primarily for use by agencies responsible for the administration of the Public and Environmental Health Regulations. However, it will also be very useful to the operators of hydrotherapy pools.

Public and Environmental Health Regulation 3 details the facilities to which the provisions of this supplement apply and defines the circumstances of application.

As provided for under Section 47(5) of the Act and Regulation 6(1)(a) , this supplement becomes part of the prescribed code and non compliance with the provisions, except for the hydrotherapy pool water turnover rate, that are applicable to the disinfection process including the maintenance of the hydrotherapy pool water so that it is chemically balanced, is deemed to be a breach of the legislation and subject to penalty as indicated in Regulation 6(3).

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INTRODUCTION

This code applies to the operation of hydrotherapy pools as defined by the Public and Environmental Health Regulations, 1991.

Hydrotherapy pools vary from other swimming pools in that they have a higher operating temperature and increased disinfectant level. The higher disinfectant level is required to compensate for the accelerated loss of the disinfecting agent which dissipates due to the increased water temperature.

They are used for a range of therapeutic purposes by persons recovering from injury or incapacity, by those who are immuno-compromised due to infection or have intellectual impairment and for fitness exercising. To minimize potential health risks to the users it is essential to ensure that the hydrotherapy pool is subject to proper management, operation and maintenance.

The code sets out the approved methods of disinfection and treatment for hydrotherapy pool water. It has been prepared as a supplement to the South Australian Health Commission Code “Standard for the Operation of Swimming Pools and Spa Pools in South Australia” for use by local councils in the administration of the legislation. It is also a useful guide for hydrotherapy pool owners and operators and will assist them to comply with the provisions of the Public and Environmental Health Regulations, and to provide a facility that is of a high standard, safe, hygienic and enjoyable for the users.

To ensure that the hydrotherapy pool is maintained in a clean, clear and safe condition this code recommends that the pool water turnover rate be at least once in every two hours or at least hourly where the use is heavy.

This code should be read in conjunction with the South Australian Health Commission Code of Practice “Standard for the Inspection and Maintenance of Swimming Pools and Spa Pools in South Australia”.

All legislation, codes of practice, standards or guidelines referred to in this code include amendments made from time to time, unless otherwise stated. The provisions of this code do not derogate from the need to comply with other laws of the State.

DEFINITIONS

<i>chlorine</i>	hypochlorous acid/hypochlorite ion (irrespective of the mode of addition or formation).
<i>combined chlorine</i>	chlorine that has combined with ammonia, ammonium compounds or organic matter containing nitrogen, to form chloramines.
<i>disinfecting agent</i>	a compound or substance which, when applied as instructed to hydrotherapy pool water, kills harmful micro-organisms.
<i>free chlorine</i>	chlorine that has not combined, but is free to kill bacteria, algae and destroy organic pollutants introduced into the hydrotherapy pool water.
<i>hydrotherapy</i>	external application of, or partial immersion in water for the treatment of illness or injury or for fitness exercising.
<i>hydrotherapy pool</i>	a pool containing heated water and specially designed to meet the therapeutic needs of persons of any age with impairments due to illness, injury, disease, intellectual handicap or congenital defects or for fitness exercising.
<i>knowledgeable person</i>	one who is able to control, manage and operate a hydrotherapy pool to ensure that the pool water complies with the requirements of the Public and Environmental Health Regulations.
<i>mg/L</i>	milligram per litre.
<i>occupier</i>	in relation to premises, means a person who has, or is entitled to, possession or control of the premises and includes a person who is in charge of the premises.
<i>operator</i>	the person who has control and management of the hydrotherapy pool, is knowledgeable in its operation and is sufficiently competent to ensure that the pool complies with the requirements of the regulations.
<i>owner</i>	in relation to premises, includes an occupier of the premises.
<i>pH</i>	scale (ranging from 0 to 14) that indicates the amount of acid or alkali present in the water. Water with a pH of 7 is neutral.
<i>relative humidity</i>	the ratio of the pressure of water vapour in the air at any time to the pressure of water vapour that would saturate the air.
<i>superchlorination</i>	the addition of sufficient chlorine to hydrotherapy pool water to raise the level of free chlorine to at least 10mg/L for the destruction of combined chlorine (chloramines), algae and other impurities.
<i>swimming pool</i>	includes any waterslide, wave pool, hydrotherapy pool or other similar structure designed for human use, other than: (a) a spa pool <i>or</i> (b) a tidal pool or other similar structure where water flows in and out according to the operation of natural forces.
<i>total alkalinity</i>	a measure of the total amount of dissolved alkaline compounds in the hydrotherapy pool water.
<i>total chlorine</i>	the sum of combined chlorine and free chlorine.
<i>turnover rate</i>	the period of time taken to achieve complete exchange of the hydrotherapy pool water through the filter.
<i>UV+H₂O₂</i>	ultraviolet light plus hydrogen peroxide disinfection system.
<i>m Ws/cm²</i>	microwatt seconds per centimetre squared.

MANAGEMENT

Where a hydrotherapy pool is available for use by the public the owner of the facility must ensure that the hydrotherapy pool is under the control and management of a person who is knowledgeable and competent in the operation and maintenance of hydrotherapy pool water. Whilst the facility is available for use by the public it is the responsibility of the owner and the hydrotherapy pool operator to ensure that the hydrotherapy pool water quality is maintained in accordance with the requirements of the Public and Environmental Health Regulations.

For the purpose of Public and Environmental Health Regulation 8(1)(a) possession of a qualification approved by the South Australian Health Commission may constitute prima facie evidence of the knowledge and competence required of a person in charge of a hydrotherapy pool. The knowledge and competence of the operator may also be assessed by the standard of the water quality within the hydrotherapy pool as detailed below.

Owners of hydrotherapy pools covered by the ambit of the regulations are responsible for ensuring that the hydrotherapy pool is correctly operated. Failure to do so could result in legal proceedings being implemented for non compliance.

Where the operator of a hydrotherapy pool fails to maintain pool water quality in the manner prescribed the authority may deem the operator not to be competent and require the owner to provide a person who is competent.

It is recommended that there should be sufficient trained staff available to provide constant supervision of persons using the hydrotherapy pool and that speckle provisions be provided for persons with impairment or disability.

WATER CLARITY

Clarity of hydrotherapy pool water refers to the clearness or lack of cloudiness of the water and it may be regarded as the distance through the water at which an object can be seen. Under the Public and Environmental Health Regulations the clarity of hydrotherapy pool water must be such that a matt black disc, or a disc that contrasts with the colour of the bottom of the hydrotherapy pool, 150mm in diameter, is (or would be) clearly visible at the deepest part of the hydrotherapy pool. Removal of suspended and colloidal matter by filtration will assist in maintaining pool water clarity.

The purpose of achieving clarity in hydrotherapy pool water is to:

- confirm the absence of particles which may shield micro-organisms from direct contact with the disinfectant
- enable persons to estimate depth, to see subsurface hazards easily and to detect submerged pool users
- provide a safe, pleasant, attractive and appealing appearance to the water.

The internal surfaces of hydrotherapy pools must provide high light reflection from the under water surfaces. This can help in detecting:

- poor water quality
- poor cleaning practices
- bathers beneath the surface who may be in difficulties.

pH & TOTAL ALKALINITY

The pH of hydrotherapy pool water can affect the disinfection efficiency. It can also effect the pool surfaces, metal fixtures, pipework, pumps and bather comfort. Where the hydrotherapy pool water is disinfected with chlorine the pH factor is much more critical. Therefore, the pH range must be limited, and its tendency to fluctuate must be controlled by ensuring a minimum level of total alkalinity. For the purpose of this code, total alkalinity is measured as calcium carbonate (CaCO₃).

Hydrotherapy pool water disinfected with chlorine or ultraviolet light plus hydrogen peroxide requires a minimum total alkalinity level of 60mg/L. However, where gaseous chlorine is used the minimum total alkalinity level is 150mg/L. This ensures that the hydrotherapy pool water is chemically balanced and can be effectively disinfected.

Total alkalinity levels greater than 200mg/L may result in scaling of fittings and surfaces, particularly with hard waters. Consequently hard waters may require treatment prior to being added to a hydrotherapy pool.

Tables 1 to 3 detail the range of pH and total alkalinity values for disinfected hydrotherapy pool waters.

TURNOVER RATE & WATER REPLACEMENT

Hydrotherapy pools have a higher level of suspended matter than other swimming pools because of their high bather load, increased operating temperature and elevated organic contaminant loading. To lessen the impact of this elevated level of suspended matter on disinfection efficacy it is recommended that the hydrotherapy pool water should be exchanged and passed through the filter at least once in every two hours. For heavily used hydrotherapy pools, such as those used for fitness exercising, the pool water turnover rate should be less than one hour. In those facilities where pool water turnover rate requirements vary, the hydrotherapy pool should be provided with a separate filter.

For hydrotherapy pools with heavy bather loads it is recommended that approximately 25% of the pool water be replaced on a weekly basis. This should prevent the level of organic matter in the pool water reaching levels which may interfere with the disinfection process.

TEMPERATURE & RELATIVE HUMIDITY

Hydrotherapy pool water should not be heated to above 38°C. An ideal range is 28-35°C.

Refer to tables 1 and 2.

Any thermostatic device controlling hydrotherapy pool water temperature should be capable of maintaining the temperature to within $\pm 0.5^{\circ}\text{C}$ of the set range. A high temperature alarm should be installed to inform users that the water temperature exceeds 38°C.

For user comfort the ambient air temperature of the hydrotherapy pool area should be no more than 10°C below the temperature of the hydrotherapy pool water.

The relative humidity level of the air in the hydrotherapy pool area should be controlled to be within the range of 50% to 75%. The level can be maintained in this range by a fan boosted supply of fresh air and extraction of humid air, or by air-conditioning with dehumidification. Care should be taken that no excessive draughts are created.

DISINFECTION & TREATMENT OF WATER

The following conditions must be achieved whenever a hydrotherapy pool is available for use:

- the hydrotherapy pool water must be disinfected by chlorine or by an ultraviolet light plus hydrogen peroxide system so that the disinfection values set out in tables 1 and 3 are maintained
- where chlorine is used the pH and total alkalinity values for the hydrotherapy pool water are to be maintained in accordance with tables 1 and 2
- where an ultraviolet light and hydrogen peroxide system is used the pH and pool water flow rate must be maintained in accordance with the requirements set out in table 3

- the hydrotherapy pool must have a filtration system that provides a continuous circulation of the pool water through the filter. Ideally the hydrotherapy pool should have its own filtration system. Cartridge filters and diatomaceous earth filters are not recommended
- all water in the hydrotherapy pool must pass through the filter as often as necessary to ensure that the water is maintained in a clean and clear condition. It is recommended that this be at least once in every two hours and for heavily used hydrotherapy pools the water should pass through the filter at least once in every hour
- the hydrotherapy pool must be fitted with automatic dosing and monitoring equipment that continuously analyses and controls the pH and disinfectant levels in the hydrotherapy pool water within the range as indicated in tables 1 and 2
- the hydrotherapy pool water clarity must be maintained in a clean, clear condition so that a 150 mm diameter matt black disc, or a 150 mm diameter disc that contrasts with the colour of the bottom of the hydrotherapy pool, is (or would be) clearly visible when viewed through the pool water at the deepest part of the hydrotherapy pool.

NOTE: Under the Public and Environmental Health Regulations stabilizers must not be used in any indoor swimming pool, which includes hydrotherapy pools since they are defined in the Regulations as being swimming pools.

It is recommended that stabilizers should not be used in outdoor hydrotherapy pools. The high operating temperature and organic loading found in outdoor pools provides an ideal environment for microbial growth. Therefore a disinfectant which acts rapidly should be used in order to control this growth.

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Hydrotherapy pools containing warm water (28-35°C) are used by persons with a wide range of medical conditions for exercise as opposed to swimming.

Pool water can become contaminated with micro-organisms arising either from the user's bodies or from the environment. Overuse and lack of proper disinfection may allow multiplication of certain bacteria and survival of certain viruses, posing a theoretical risk that subsequent users may become infected with such organisms. Hydrotherapy pools should therefore be correctly maintained and disinfected, chlorine being the disinfectant of choice at minimum free chlorine levels of 2.0mg/L.¹

There are certain medical conditions in which hydrotherapy is contra-indicated, eg unstable cardiac conditions, acute infections and the presence of open or discharging wounds. The users and use of hydrotherapy pools should be subject to proper supervision.

With regard to human immunodeficiency virus (HIV), survival or transmission of HIV in pool water has not been documented. HIV is susceptible to commonly used disinfectants especially those which are chlorine-based.² Therefore, if hydrotherapy pools are properly disinfected and their use supervised, then use by patients with HIV infection poses no measurable risk to others.

References

1. Australian Standard 2610Part 1: Public Spa Pools, 1983, p10-11.
2. SPIRE B et al, Inactivation of lymphadenopathy associated virus by chemical disinfectants, *Lancet* 1984; ii:899-901.

TABLES

TABLE 1: Hydrotherapy pool water disinfected with chlorine

<i>Pool water temperature</i>	<i>pH</i>	<i>Total alkalinity mg/L</i>	<i>Unstabilized pool water mg/L</i>	
Ideal	Min - Max	Min - Max	Minimum free chlorine *,	Maximum total chlorine *
28 - 35°C	7.2 - 7.6	60 - 200 **	2.0 ***,	Free chlorine as measured + 1.0

* Disinfection values

** If gaseous chlorine is used the total alkalinity value must be in the range 150-200mg/L.

*** For hydrotherapy pools operating at the upper temperature limit and under heavy bather loads it is recommended that the residual free unstabilized chlorine concentration be at least 4.0mg/L.

NOTE: Under the legislation stabilizers are not to be used in indoor hydrotherapy pools and it is recommended that they should not be used in outdoor hydrotherapy pools

TABLE 2: Hydrotherapy pool water characteristics

<i>Characteristics</i>	<i>Range Min - Max</i>	<i>Comments</i>	
pH	7.2 - 7.6	If pH is below 7.2 then there is a possibility of: - eye discomfort due to accelerated formation of chloramines - rapid loss of chlorine - etching of exposed cement finished pools - corrosion of metals	If pH is above 7.6 then the possibility of: - reduction of chlorine disinfection efficiency - increased chlorine requirement - eye discomfort - drying of skin - cloudy water and - scale formation
Total alkalinity when disinfected with: - calcium hypochlorite - sodium hypochlorite - salt chlorinator - gaseous chlorine	60 - 200 mg/L 60 - 200 mg/L 60 - 200 mg/L 150 - 200 mg/L	If total alkalinity is below 60,, then there is a possibility of: - pH fluctuation due to weak buffering effect - corrosion of metal	If total alkalinity is above 200 then the possibility of: - high pH - cloudy water and - scale formation
Temperature	Ideal 28° - 35°C 38°C Max	If the temperature is too low, then bathers may experience discomfort	If the temperature is too high then the possibility of: - increased use of chlorine - bather discomfort - increased evaporation and - increased scaling potential

TABLE 3: Operating criteria for hydrotherapy pool water disinfection using the ultraviolet light plus hydrogen peroxide system

Ultraviolet light	$\geq 30\,000\text{ mWs/cm}^2$ *
Pool water flow rate	$\leq 150\text{ L/min}$
Pool water turnover rate	$\leq 2\text{ hours}$ **
Hydrogen peroxide (H ₂ O ₂) level	$\geq 40\text{ mg/L}$ *
pH	7.2 - 7.6
Total alkalinity	60 - 200 mg/L

* Disinfection values

** Under the legislation the pool water turnover rate for swimming pools, which includes hydrotherapy pools, is to be at least once in every 6 hours. However, it is recommended that the pool water turnover rate for hydrotherapy pools be at least once in every two hours and for heavily used pools it should be less than one hour.

NOTE: *The ultraviolet light plus hydrogen peroxide system has been approved for use in indoor hydrotherapy pools having a capacity up to 500 000 litres.*

ACKNOWLEDGMENTS

This code was developed by a working party comprising representatives from the following organisations:

- Australian Institute of Environmental Health (S.A. Division)
- Australian Institute of Swimming and Recreation Centre Management (S.A. Division)
- Local Government Association of South Australia, Legal Services
- Swimming Pool and Spa Association of Australia (S.A. Division)
- South Australian Swimming Pool and Spa Industry
- South Australian Health Commission, Environmental Surveillance Section.

The Public and Environmental Health Council wishes to convey its sincere appreciation to the supporting organisations for making a representative available and to each member of the working party for their valued technical contribution.

REFERENCES

Public and Environmental Health Act, 1987 and Regulations, 1991.

Australian Standards

2610 Spa Pools.

2610-1 Part 1: Public Spas.

2610-2 Part 2: Private Spas.

3633 Private Swimming Pools - Water Quality.

LANG, Bryce, *The Fundamentals of Private Swimming Pool Operation and Chemical Treatment*.

MITCHELL, P. Kirk, *The Proper Management of Pool and Spa Water*. Hydrotech Chemical Corporation.

CLAYTON, Robert D., THOMAS, David G, *Professional Aquatic Management*. Second Edition, Human Kinetics Books. Champaign, Illinois.

GABRIELSEN, M. Alexandir, *Swimming Pools - A Guide To Their Planning, Design and Operation*. Fourth Edition, Human Kinetics Publishers Inc. Champaign, Illinois.

Australian Guidelines For Heated Spa Pools. National Health and Medical Research Council, Commonwealth of Australia, 1990.

Australian Guidelines For Disinfecting Private Swimming Pools. National Health and Medical Research Council, Commonwealth of Australia, 1989.

Public Swimming Pools. American Public Health Association.

SALVATO, Joseph A. *Environmental Engineering and Sanitation*.