# CODE OF PRACTICE

## FOR THE DESIGN, CONSTRUCTION, OPERATION, MANAGEMENT & MAINTENANCE OF AQUATIC FACILITIES

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# CODE OF PRACTICE FOR THE DESIGN, OPERATION, MANAGEMENT AND MAINTENANCE OF AQUATIC FACILITIES

**FOREWORD**

This Code of Practice has been prepared to ensure public aquatic facilities are operated to consistently high health and safety standards, by minimising the occurrence of disease, injury and other health-related complaints associated with the use of these facilities.

The Code is divided into 11 sections, which include administrative provisions, design and construction requirements, water treatment, chemical safety, water quality, management and supervision, operational and sanitary requirements, plus requirements for special facilities such as spas, hydrotherapy pools and waterslides.

The Code is aimed primarily at designers, builders and operators of aquatic facilities, together with the agencies responsible for administration of the Health Act, such as State and Local Government Health Departments, Environmental Health Officers and associated practitioners.

The Code is published by the Executive Director, Public Health under the provisions of *section 344A(2)* of the *Health Act 1911*, and is to be read in conjunction with the *Health (Aquatic Facilities) Regulations 2007*. It replaces the previous *Health (Swimming Pools) Regulations 1964*.

Premises classified as aquatic facilities by the *Health (Aquatic Facilities) Regulations 2007* are required to comply with these provisions.

Please note that although this Code of Practice is intended to be a fairly comprehensive document, pool applicants need to be aware that they may need approval from other regulatory mechanisms not documented herewith.

## INTRODUCTION

In the past, aquatic facilities consisted of relatively simple outdoor rectangular swimming pools, designed primarily for diving and swimming teaching, training or competition.

In more recent times, aquatic facilities have been established that incorporate a variety of special-use features such as spa pools, river rides, water slides and hydrotherapy pools. These have contributed to a growth in popularity of swimming and other water activities for sport, fitness, rehabilitation and recreation.

Owners and operators of aquatic facilities need to ensure their premises are attractive, hygienic and provide a high degree of bather comfort. There is a public expectation that facilities will be designed, operated and maintained in such a manner that they will pose no risk to the safety or health of their patrons.

Improper design, maintenance or operation can result in aquatic facilities becoming a source of infection and injury. Aquatic facilities may be used by people who are of varying ages, states of health and standards of hygiene. These people introduce a range of pollutants to the water, including saliva, urine and other body secretions, skin, hair, and sunscreen lotions. Other sources of pollutants include dust, bird droppings, tree leaves, lawn clippings, make-up water, soil and untreated reticulation water.

All of these pollutants can be accompanied by a variety of micro-organisms, some of which have the ability to survive, and even multiply, in recreational water.

A number of the micro-organisms have the ability to cause infections in various parts of the body, such as the eye, ear and skin, gastrointestinal and nervous systems.

Consequently, aquatic facilities need to be equipped with water treatment processes that provide continuous disinfection that is capable of quickly and effectively killing disease-causing micro-organisms, to prevent diseases being transmitted to other patrons. Proper design and operation of facilities can enhance the action of the disinfection process.

Special care needs to be taken with spa pools, hydrotherapy pools and other facilities that operate with elevated water temperatures, as they provide environments that are even more conducive to the survival and growth of disease-causing micro-organisms.

Correct use of chemicals employed to disinfect the water is required, as inappropriate use can cause patrons to suffer irritation of the eyes, and skin conditions such as dermatitis. Approved methods of water treatment and disinfection are set out in this Code of Practice.

Appropriate design of facilities has also been found to assist in prevention of drowning and other injuries.

The provisions of this Code of Practice do not remove the need to comply with other laws of the State.

# SECTION 1 – ADMINISTRATIVE PROVISIONS

## 1.1 DEFINITIONS

**Approved Process of Cleaning**
A process whereby bathing costumes and towels for loan or hire are thoroughly washed in water with soap or detergent, or by a process of dry cleaning.

**Aquatic Facility**
A man-made body of water used for sport, recreation or educational water activities, as defined in the Aquatic Facilities Regulations.

**Aquatic Facility Concourse**
That part of an aquatic facility that is directly adjacent to an aquatic facility water body.

**Aquatic Facility Water Body**
That part of an aquatic facility used for aquatic activities.

**Bed and Breakfast Establishment**
An owner-occupied dwelling providing accommodation and breakfast for transient paying guests.

**Deep Water**
An aquatic facility water body with a water depth at any location greater than, or equal to 1.8m.

**Disinfection**
The destruction of all disease-causing micro-organisms.

**Diving Pool**
A man made body of water used for competitive or recreational diving, including springboard or platform diving.

**Environmental Health Officer**
Environmental Health Officer appointed under the Health Act 1911.

**Executive Director Public Health (EDPH)**
Executive Director Public Health, Department of Health – Western Australia.

**FINA**
Federation Internationale De Natation.

**Hydrotherapy Pool**
A pool containing heated water, designed to meet the therapeutic needs of persons of any age with impairments due to illness, injury, disease, intellectual handicap, congenital defects, or for fitness exercising, recreational and educational purposes.

**Landing Pool**
A body of water located at the exit of a waterslide, used to break the fall of waterslide users.

**Leisure Pool**
A swimming pool used for recreational purposes.

**Lifeguard**

A person who is appropriately qualified and experienced, with primary responsibility for observation of water areas to anticipate problems, control behaviours and hazards, identify emergencies, carry out rescues, give immediate first aid, communicate with swimmers and recreational water users, enforce regulations where appropriate, promote awareness of specific and general hazards, and report incidents.

**Off-Season Period**

The time of year during which an aquatic facility is not available for use.

**Operator**

A person who is the occupier of the land or premises on or in which the aquatic facility is located and any other person concerned with the operation of the facility other than as an employee.

**Pool Safety Guidelines**

Pool Safety Guidelines, published by the Royal Life Saving Society Australia.

**Radius of Curvature**

The radius arc that denotes the curved surface from the point of departure from the vertical side wall of the pool to the bottom of the pool.

**River Ride**

An aquatic facility that is designed to simulate the effects of a natural river, and incorporates a system to produce an artificial current of water, created to propel patrons along with, or without the use of a floating vessel.

**Slip Resistant**

A surface is slip resistant, if the available friction is sufficient to enable a person to traverse that surface without an unreasonable risk of slipping.

**Spa Pool**

A man-made pool or other water-retaining structure designed for human use, which has a capacity of not less than 680 litres, which may or may not be heated. It incorporates, or is connected to, equipment for heating the water contained in it and injecting air bubbles or jets of water under pressure, so as to cause general turbulence in the water.

**Starting Platforms**

An elevated structure located on the side of a swimming pool, designed for use by swimmers in competitive lap-swimming events.

**Supervision**

Adequate and constant surveillance of persons in the water by a person appropriately qualified to anticipate problems, identify emergencies quickly and provide an appropriate and timely response.

**Swimming Pool**

A man-made structure capable of being filled with water, and intended to be used for swimming, diving, wading or paddling, that cannot be emptied by a simple overturning of the structure. The definition does not include individual therapeutic tubs or baths used for cleaning of the body.

**Technical Operator**

A person who holds a current technical operations qualification obtained from an approved training program and who engages in the daily operation and maintenance of an aquatic facility.

**Wading Pool**

A swimming pool designed for wading, where the water depth is less than 300mm.

**Wall-to-Floor Junction Radius**

Is the radius determined by using the following formula:
Junction Radius = Water Depth – Vertical Wall depth (measured from the water line).

**Walkway**

Any surface of an aquatic facility, other than the aquatic facility water body, upon which staff or patrons walk.

**Water Playground**

For the purpose of this Code, is an area designed for children's play that incorporates a body of water, captured in a pool like arrangement, or that is appurtenant to the aquatic facility, for the purpose of bathing or recreation. The floor of a water playground may have an undulating surface.

**Waterslide**

A device incorporating an inclined sliding surface, where a patron's body comes into direct contact with a water medium that is used to propel, or decelerate a body within a water flume, which terminates in a landing pool and/or watershed area.

**Wave Pool**

An aquatic facility designed to simulate the effects of a beach, and which incorporates a system to produce artificial wave motion.

## 1.2 CLASSIFICATION OF AQUATIC FACILITIES

For the purposes of this Code, aquatic facilities shall be classified in accordance with Table 1.

**Table 1 – Classification of Aquatic Facilities**

| Patron Access Limitations | Activity | Operator/ Manager Requirements | Patron Supervision/ Emergency Care Personnel | Classification |
|---|---|---|---|---|
| Public access with limited restrictions, such as age without an accompanied adult | Non structured activity<br><br>*Typical examples;* Leisure, Free-play, Lap-swimming) | On-site at all times. | All patrons directly supervised. Emergency care personnel on-site at all times. | **Group One**<br>*Facilities generally include;*<br>Aquatic Centres, Waterslides, Resorts (multiple pools/spas) |
| Restricted to discrete users and user groups | Structured activity<br>Qualified activity leader present<br><br>*Typical examples;* Infant Aquatics, Learn-to-Swim, Swimming and Lifesaving classes and Aqua-exercise | Not on-site at all times. | All patrons directly supervised. Emergency care personnel on-site at all times. | **Group Two**<br>*Facilities generally include;*<br>Schools, Learn to Swim Centres, Hospital Pools, Physiotherapy Use Pools |
| Restricted to discrete users and user groups<br><br>*Typical examples;* members, residents and guests | Non structured activity<br>No qualified activity leader present<br><br>*Typical examples;* Leisure, Free-play, Lap-swimming) | Not on-site at all times. | No direct supervision. Emergency care personnel on-site. | **Group Three**<br>*Facilities generally include;*<br>Community Operated Facilities, Hotels, Motels, Health Clubs, Resorts, Hydrotherapy Pools, Caravan Parks, Recreational Campsites, Minesites, Places of Adult Entertainment |
| Restricted to owner/occupier residents and guests | Non structured activity<br>No qualified activity leader present<br><br>*Typical examples;* Leisure, Free-play, Lap-swimming | Not on-site at all times. | No direct supervision. No emergency care personnel on-site. | **Group Four**<br>*Facilities generally include;*<br>Aquatic Facilities in Strata-titled Body Corporate premises with ≥ 30 lots, Bed and Breakfast and Farm-Stay Facilities |

## SECTION 2 – DESIGN AND CONSTRUCTION REQUIREMENTS

Aquatic facilities are complicated structures that need to be designed to provide patrons with maximum levels of safety. Aquatic facilities can be subject to relatively large forces, from a range of sources.

Fibre-reinforced plastic pools are mainly used for smaller aquatic facilities, due to the speed of installation, and the variety of designs now available. This type of structure is normally manufactured at industrial premises and transported to the site for installation.

Aquatic facilities can become harsh environments that impose unique requirements upon materials used for construction. Correct selection of materials is essential to ensure the longevity of a facility, and can assist with ongoing maintenance and care of a facility.

Designing and constructing aquatic facilities with appropriate surface finishes can contribute to the safe and hygienic operation of the premises. A suitable finish will assist staff to carry out effective maintenance, by enabling dirt and visible contaminants to be detected, and assist in safety, by allowing submerged patrons to be seen easily. The use of non-slip floor materials will reduce the risk of slip and fall injuries to patrons and staff.

Ensuring aquatic facility water bodies are designed with appropriate wall slopes, wall and floor junctions, access and egress points, and separation distances between shallow and deep facilities, ensures patrons can safely enter and exit facilities. Appropriate floor gradients ensure patrons do not inadvertently move from shallow sections of a facility to deep sections, where they may not be able to swim.

Eliminating entrapment zones in aquatic leisure equipment, and ensuring adequate water depths are provided for certain aquatic activities, can reduce the potential for serious injuries.

A given depth of water may appear to be deeper or shallower when viewed from the concourse. Depth markings and signage assists patrons to make informed decisions about their ability to swim in a facility, and whether it is safe to perform activities such as diving.

The concourse directly surrounding aquatic facilities may need to accommodate considerable amounts of water from a variety of sources. Depressions in the concourse can result in pooling of water, providing an environment conducive to the survival and growth of micro-organisms. Inadequate drainage can allow contaminated water to run back into the water body. Irregularities in the concourse surface may create slip and trip hazards.

Adequate ventilation is required in indoor facilities to maintain air quality. Ventilation systems must be able to adequately dilute the concentration of water vapour and by-products of the water treatment processes.

All wastewater produced from aquatic centres needs to be disposed of in an appropriate manner, to prevent the creation of health hazards.

Displaying safety signage and behaviour rules informs patrons of the hazards in facilities, and may improve patron conduct.

Some larger aquatic facilities are used for competitive events that are attended by a significant number of spectators. These facilities require spectator seating areas and stands that are designed and constructed to support patrons safely.

Adequate lighting ensures aquatic facilities used after the hours of darkness are provided with sufficient illumination levels, which assists patrons to engage in safe activities and allows supervisors to see persons in the water.

Providing aquatic facilities with adequate fencing and security has been found to be effective in minimising drowning incidents, especially those involving young children.

Community exposure to ultraviolet radiation can be reduced by creating shaded recreational spaces.

Aquatic facilities create harsh environments that produce special electrical hazards. It is essential for electrical equipment to be correctly installed, maintained in a safe condition and tested regularly.

## 2.1 GENERAL STRUCTURAL REQUIREMENTS

Aquatic facilities shall be structurally sound, and engineered to withstand all forces imposed by the design of the facility and its anticipated use.

## 2.2 FIBRE-REINFORCED PLASTIC POOLS

Pre-moulded fibre-reinforced plastic pools shall be designed, fabricated and installed in accordance with the following Australia New Zealand Standards:

- AS / NZS 1838 – 1994: Design and Fabrication.
- AS / NZS 1839 – 1994: Installation.

## 2.3 OTHER POOLS

### 2.3.1 Spa Pools

In addition to the requirements of this Section, spa pools shall comply with the provisions in Section 9 of this Code.

### 2.3.2 Hydrotherapy Pools

In addition to the requirements of this Section, hydrotherapy pools shall comply with the provisions in Section 11 of this Code.

## 2.4 CONSTRUCTION MATERIALS

Aquatic facilities shall be constructed of materials that are non-toxic to humans under normal conditions of use, impervious, enduring, capable of withstanding design stresses, and provide a watertight structure.

## 2.5 SURFACE FINISHES – WATER BODIES

Aquatic facility water bodies shall be provided with surface finishes that comply with the requirements of this Section.

The walls and floors shall be smooth, impervious, durable, easily cleanable and continuous, with no cracks, joints or protrusions other than structural joints. Floor surfaces shall be slip resistive.

The colour of wall and floor finishes shall be no darker than the colours listed in Appendix 1, as defined by AS 2700 – 1996: Colour standards for general purposes. This requirement does not apply to:

- Lane markings
- Safety markings
- Hand holds
- Copings
- Step edges

The walls and floors shall not incorporate designs that are shaped in a form that may be reasonably mistaken for a human form, or that may inhibit detection of submerged persons.

## 2.6 USE OF SAND AND EARTH MATERIAL

Clean sand, or similar material, if used in a beach pool, shall only be used over an impervious surface. The sand shall be specifically produced for use in such an environment, and used in such a manner as to not adversely affect the proper filtration, water treatment, maintenance, safety, sanitation, water clarity and operation of the overall aquatic facility. Positive up-flow circulation of water through the sand shall be provided at all times.

## 2.7 OBSTRUCTION AND ENTRAPMENT

Aquatic facility water bodies shall not be designed or constructed with obstructions that can cause patrons to become trapped or injured. Examples include wedge or pinch-type openings and rigid cantilevered protrusions.

All protruding edges and corners of facilities shall be rounded. Fixtures and fittings in the walls and floors of the water body, shall be fitted flush and have no sharp and protruding edges.

## 2.8 WALL SLOPES

### 2.8.1 Prefabricated Pools

Prefabricated pool walls shall not slope towards the pool by more than 11° for at least 75% of the depth of the pool, at any point along its perimeter. Any projections such as safety ledges shall be confined within the 11° angle from the top of the pool wall, and shall not project outwards greater than 600mm.

### 2.8.2 Non-Prefabricated Pools

Non-prefabricated pool walls shall be vertical for at least 75% of the depth of the pool, at any point along its perimeter. Any projections such as safety ledges shall be confined within the 11° angle from the top of the pool wall, and shall not project outwards greater than 600mm.

### 2.8.3 Diving Bowls

The wall slopes for diving pools, or diving bowls, shall comply with FINA design requirements.

## 2.9 RADIUS OF WALL AND FLOOR JUNCTIONS

Where a radius is required, the wall-to-floor junction radius in aquatic facility water bodies shall be coved and easily able to be cleaned.

## 2.10 FLOOR GRADIENTS

An aquatic facility water body of less than 12.5 metres in length shall have a pool floor with an even gradient so that there is no sudden increase in depth.

An aquatic facility water body of 12.5 metres or more in length shall have pool floor slopes that do not exceed 1:15, where the water depth is less than 1.75 metres.

Changes within the floor gradient at a water depth greater than 1.8m shall be highlighted with a contrasting colour, such as contrast tiles or painted lines.

## 2.11 MINIMUM WATER DEPTHS

Aquatic facilities shall be designed and constructed so that water depths are appropriate for the expected usage of the facility.

Facilities should comply with Guideline FD1.01 – *Design of Pool Tank -1996* of the Pool Safety Guidelines.

The depth of spa pools shall comply with the requirements of Section 9 of this Code.

Water depths in areas surrounding starting platforms shall comply with the requirements of 2.14 Starting Platforms within this section of the Code.

## 2.12 DEPTH MARKINGS

### 2.12.1 General Requirements

Depth markings of a permanent nature, and colour contrasting to the background, shall be installed around aquatic facilities water bodies at intervals not exceeding 7.5 metres, such that they are readily visible to persons entering the water body.

### 2.12.2 Location

Depth markings shall indicate maximum and minimum water depths and designate water depths at all major deviations in shape for irregularly shaped water bodies. All bodies of water, where there is a change in floor gradient shall have a pictorial sign displayed, to indicate a change in the floor depth.

Depth markings shall be located close as practicable to the corners of all square/rectangular shaped water bodies, near to all designated entry points and shall not be located directly over stair/step entries.

Depth markings shall be displayed around all horizontal or outside vertical aquatic facility water body surfaces, which may enable patron access, comprising of one, or a combination of the concourse, coping deck, pool hob or header.

Depth markings shall also be displayed on the inside vertical water body surface clearly above the water line in corresponding locations to horizontal depth markers where possible. Markings are not required on the inside vertical face of the water body, where the water level is < 125mm below the concourse, coping deck or header.

### 2.12.3 Dimensions

Depth marking dimensions shall be:

- at least 90mm high when positioned in the horizontal plane;
- at least 90mm high, when positioned in the vertical plane.

The height-to-width ratio of each numeral/letter contained within a depth marking shall be 3:1.

### 2.12.4 Spa Pools

Depth Markings for Spa Pools shall comply with the provisions of Section 9 of this Code.

## 2.13 ACCESS AND EGRESS

### 2.13.1 General Requirements

Access into or egress from an aquatic facility water body shall consist of one or a combination of the following:

Stairs/steps, ladders, swim-outs, pool-seats, landings, ramps or beach entries.

Aquatic facility water bodies shall have a means of access/egress at the shallowest point, if the water depth exceeds 600mm. A means of egress shall be provided in the deepest point of the water body, if the water depth is 1.8m or greater. Where the water body is greater than 9 metres wide, a means of egress shall be provided on both sides of the water body at the deepest point.

Handrails shall be provided for ramps and each set of steps/stairs.

All surfaces for access/egress shall be slip-resistive in accordance with Appendix 6 – Slip Resistance Performance and Testing.

### 2.13.2 Dimensions

Swim-outs, pool-seats and landings shall extend a maximum width of 600mm from the vertical pool wall at any given perpendicular point along the pool wall and shall be located at a maximum height of 450mm below the pool concourse, coping deck or header. The outer 50mm edge of the swim-out, pool-seat, or landing tread shall be finished in a contrasting colour.

Stairs/steps for water bodies less than 12.5m in length shall have a minimum horizontal tread depth of 200mm, and a maximum rise of 300mm, except for the bottom riser height to the floor, which may vary. The outer 25mm edge of the stair/step tread shall be finished in a contrasting colour.

Stairs/steps for water bodies 12.5m, or greater in length shall have a minimum horizontal tread depth of 300mm, and a maximum rise of 250mm. The outer 50mm edge of the stair tread shall be finished in a contrasting colour.

### 2.13.3 Spa & Hydrotherapy Pools

Spa Pools and Hydrotherapy Pools shall be provided with means of access and egress as provided in section 9 and 11 of “The Code”.

## 2.14 STARTING PLATFORMS

Starting Platforms shall be designed and constructed in accordance with clauses 5.1 and 5.2 of Guideline FD 1.24 - *Design of Starting Blocks - 2002* of the Pool Safety Guidelines. For the purposes of this section of the Code, provisions in the Guidelines incorporating the word "should" shall be construed as mandatory requirements.

## 2.15 VENTILATION

Indoor aquatic facilities shall be provided with mechanical ventilation systems. The systems shall have a minimum ventilation capacity as required by this Section. The capacity of the systems shall be calculated based on the following:

Occupancy:

- Deck and pool 3.5 $m^2$ per person.
- Spectator areas: 1.5 $m^2$ per person.

Ventilation requirements:

- 10 litres per second of outdoor air per person, *or*
- 10 litres per second per $m^2$ of total floor area including pools as determined by the design engineer.

## 2.16 LIGHTING

While in use, aquatic facilities shall be provided with sufficient lighting to enable every part of the facility, including the underwater area, to be observed, without interference from direct or reflected glare from the lighting sources.

Lighting requirements do not apply within fully enclosed waterslide flume sections.

The water surface of water bodies located within Group One and Group Two facilities used after sunset, shall be illuminated by overhead lighting to a minimum level of 80 lux, and to such a level that will allow a Secchi disc placed on the floor of the water body to be seen from the concourse. Refer to AS 3550.7-1993, (Waters) Part 7: The construction and use of the Secchi disc.

The water surface of water bodies located within Group Three and Group Four facilities used after sunset, shall be illuminated by overhead lighting to a minimum level of 30 lux, and to such a level that will allow a Secchi disc placed on the floor of the water body to be seen from the concourse.

Aquatic facility concourses shall be illuminated in compliance with the above requirements to a distance of 3 metres from the water body.

Indoor facilities shall be provided with lighting systems that can achieve the above illumination levels. All areas of waterslide facilities that are available to the public shall also comply with these requirements.

Lighting fixtures must be of a type and located so as they shall not cause glare to supervisory staff, or patrons using the facility.

Diving pools and areas of combined facilities used for diving, must be provided with lighting installations that comply with AS 2560.2.5 – 1994: Guide to sports lighting – Specific recommendations – Swimming pools.

Aquatic facilities not provided with lighting shall be provided with signage at all access points into the facility, which incorporates the statement “No Use of Facility Allowed After Dark” in letters at least 100mm high.

## 2.17 CONCOURSES AND WALKWAYS

The requirements of this Clause shall not apply to shower and sanitary facilities in private residential premises associated with Group Four facilities, or any concourse areas consisting of grass.

Aquatic facility concourses shall be at least 1000mm wide and of sufficient width to ensure the safety of patrons around the water body.

All concourses and walkways shall be provided with surfaces that are smooth, free of protrusions that may constitute a trip hazard, impervious, durable, easily cleanable and continuous, with no cracks or joints other than structural joints.

All installed surfaces shall be slip-resistant and maintained such that the available friction is sufficient to enable a person to traverse the surface without unreasonable risk of slipping.

Refer to Appendix 6 for guidelines on the measure of slip resistance that should be maintained within certain areas of an aquatic facility.

Adequate drainage shall be provided in all areas that may become wet. The concourse shall be graded to drain away from the water body, to prevent water from accumulating on the concourse or draining back into water bodies. All general site and roof drainage shall be directed away from water bodies.

Garden areas adjacent to aquatic facilities shall be designed to prevent soil from falling or draining, onto the concourse, or into the water body.

The layout of the concourse shall enable supervising staff to move around freely, without losing visual contact with water areas.

Garden boxes and other features on the concourse shall not interfere with sightlines for supervision.

The concourse of facilities constructed above ground level shall be constructed with a balustrade, fence or other means that will prevent persons falling to lower levels.

## 2.18 FENCING AND SECURITY

Whenever the facility is not in use, Group One and Group Two facilities shall be provided with security measures that deter the unauthorised entry of persons.

Group Three and Group Four facilities shall be provided with fencing and security measures that comply with Australian Standard AS 1926.1 – 1993: Swimming pool safety – Fencing for swimming pools and for the purpose of this Code a door that provides access into the pool area, shall comply with clause 2.14 Child-resistant doorset of this standard.

Group Three and Group Four facilities may be provided with alternative fencing and security measures, provided they afford an equivalent or greater degree of safety to AS 1926.1 – 1993: Swimming pool safety – Fencing for swimming pools.

## 2.19 SEPARATION DISTANCES

Toddler pools and learner pools shall be situated away from the deep areas of other pools, and away from diving pools.

Where this is not possible, effective transparent barriers and appropriate signage shall be provided.

## 2.20 SANITARY AMENITIES

Aquatic facilities shall be provided with toilets, hand-wash basins, showers and change rooms.

Toilets must be provided for spectators in Group One, Group Two and Group Three facilities in accordance with the requirements of parts F 2.3 and 2.4 of the Building Code of Australia - 2007.

Facilities shall be provided for persons using the aquatic facilities in accordance with the following requirements:

- One water closet for every 40 female patrons.
- One water closet plus one urinal for every 60 male patrons.
- One shower for every 40 patrons.
- One hand basin for every 60 patrons.

Sanitary facilities shall not be located further than 90m from the water body on the horizontal plane and as close as practicable on the vertical plane in the case of high rise complexes.

The number of patrons in waterslide facilities shall be designated by the maximum number of persons permitted to use the waterslide at any one time.

The number of patrons for all other aquatic facilities is to be calculated by allowing one person for each 2.3 square metres of water body surface area and allocating the final number as 50 per cent male and 50 per cent female.

Floor surfaces for toilets, showers and change rooms shall be impervious, slip-resistant when wet and sloped with a minimum grade of 1 in 50 to floor drains or other drainage areas.

Sanitary facilities are not required in Group Four aquatic amenities, where provision is made for bathers in their accommodation quarters.

## 2.21 BACKWASH WATER

The onsite discharge of backwash water from an aquatic facility water body shall be disposed of in a manner that has been approved by the local government.

## 2.22 FIRST AID FACILITIES

Aquatic facilities shall be provided with minimum first aid facilities as detailed in Table 2.

**Table 2 – First Aid Facilities**

| Type of Facility | Mandatory First Aid Facilities |
|---|---|
| Group One | A separate room or area containing all of the following items:<br>1. Resuscitation Notice.<br>2. Examination couch.<br>3. Hand wash basin with reticulated potable water.<br>4. Communication System.<br>(Ready access to a telephone with emergency number posted close by)<br>5. One GPO outlet.<br>6. Work bench for the preparation or the cleaning and sterilisation of items used in first aid treatment.<br>7. Storage for first aid supplies and equipment.<br>8. Washable flooring. |
| Group Two<br>and<br>Group Three | A separate room or area containing all of the following items:<br>1. Resuscitation Notice.<br>2. Hand wash basin with running water.<br>3. One GPO outlet.<br>4. Storage for first aid supplies and equipment.<br>5. Washable flooring. |
| Group Four | Resuscitation Notice - displayed in a prominent position in the aquatic facility area. |

### 2.22.1 Dimensions of First Aid Area

The design and construction of first aid areas shall ensure these places can accommodate the items listed in the Table above.

### 2.22.2 Signage

Signage shall be provided at the pool area that clearly identifies the location of the first aid room. The design and installation of first aid signs shall follow the formats outlined in AS 1319 – 1994: Safety Signs for the Occupational Environment.

## 2.23 FIRST AID EQUIPMENT

Aquatic facilities shall be provided with first aid equipment as detailed in Table 3.

**Table 3 – First Aid Equipment**

| Type of Facility | Mandatory First Aid Equipment |
|---|---|
| Group One | 1. Resuscitation Equipment (capable of delivering oxygen therapy and oxygen supplementation for expired air resuscitation) for children and adults.<br>2. First Aid Kit.<br>3. Spinal Board and Extrication Collars.<br>4. Pillows and Blankets.<br>5. Pocket Mask and Disposable Gloves.<br>6. Stretcher. |
| Group Two and Group Three | 1. First Aid Kit.<br>2. Two Pillows and Blankets.<br>3. Pocket Mask and Disposable Gloves.<br>4. Stretcher. |
| Group Four | First aid equipment is not required to be maintained on-site. |

## 2.24 RESCUE EQUIPMENT

Group One, Group Two and Group Three aquatic facilities, excluding waterslide landing pools or watershed areas shall be provided with appropriate rescue equipment, which shall be stored in a readily accessible location.

Examples of appropriate rescue equipment include reaching poles, rescue tubes, lifejackets and throwing ropes or throwing bags, as detailed in Guideline GO 1.03 - *Rescue Equipment - 1996* of the Pool Safety Guidelines.

## 2.25 SAFETY SIGNAGE

All aquatic facilities shall be provided with signage that details acceptable patron behaviour, and other safety rules. The signage shall be displayed in a prominent location, and contain rules that are appropriate for the nature of the activities conducted at the premises.

A list of suggested signage can be found in Guideline FD 1.04 – *Advisory Signage - 1995* of the Pool Safety Guidelines.

Recommended formats and symbols specific to water safety signage are contained in AS 2416-2002, (Design and Application of Water Safety Signs), AS 2899.0-1986, (Public Information Symbol Signs-Consolidated Index) and AS 2899.2-1986, (Public Information Symbol Signs -Water Safety Signs).

Recommended safety signage for swimming pools, spa pools and waterslides is contained in Appendix 2 of this Code.

Group Three and Group Four facilities shall ensure there is a warning sign erected at the entrance to the facility which states “Warning – No Lifeguard on Duty”, in clearly legible letters at least 100mm high.

## 2.26 SPECTATOR STANDS AND SEATING AMENITIES

Spectator facilities need to be designed and constructed to support patrons in a safe manner. Poorly designed and constructed spectator structures may fail when under load, resulting in mass injuries and casualties.

Aquatic facilities which are used for organised events such as swimming competitions, swimming tuition, and water aerobics, are classified as Public Buildings under the Health Act 1911.

The Act requires facilities to comply with the safety requirements of the Health (Public Buildings) Regulations 1992. The Regulations stipulate a number of spectator safety requirements, such as the need to provide exits.

Although the Regulations do not contain specific requirements for spectator stands, they require all public buildings to be approved by the local government.

In approving public buildings, the local government may require a proponent to demonstrate that the spectator facilities, in this case the stands and seating facilities, are safe.

All spectator stands and seating facilities, whether permanent or temporary, should be certified by a practising structural engineer, as being safe for the proposed use.

The Department of Health's Guidelines on the Application of the Health (Public Buildings) Regulations 1992 - 2002 is a useful reference in approving large temporary structures.

### 2.27 SHADE PROTECTION

The provision of shade is recommended for all outdoor aquatic facilities and, where provided, shall comply with the requirements stipulated in *Shade for the Public – Guidelines for Local Government in Western Australia,* published by the Cancer Foundation of Western Australia 1999. Group Four facilities are not required to comply with this requirement.

Where facilities choose to erect shade structures, they shall be carefully positioned to ensure that they do not obscure overhead lighting towers.

### 2.28 ELECTRICAL SAFETY

All electrical installations shall comply with AS/NZS 3000:2000 – Electrical installations (Wiring rules).

Floor standing switchboards in plant rooms shall be mounted on plinths, minimum height 75mm.

The following items must be equi potentially bonded in accordance with the method prescribed in Section 5 of AS/NZS 3000:2000 - Electrical installations (Wiring rules):

- All metallic lane rope anchors, deck sockets or other metallic objects with a dimension greater than 100mm in a location accessible to the public that is likely to become wet whilst the public are in attendance.

Only electrical outlets required to service specific maintenance equipment shall be installed within three metres of aquatic facility water bodies.

Electrical outlets in areas accessible to the public shall be installed no less than 1200mm above floor level. Electrical outlets must not be installed in areas that are likely to become wet during normal operation of the facility. This requirement applies to areas that may be hosed down whilst the facility is open to the public.

Electrical outlets shall not be installed in areas of change rooms that may become wet, and must only be located in dry grooming areas.

Every electrical outlet shall be protected by a Residual Current Device (RCD) with a rated tripping current of no more than 30 mA.

Additional requirements for electrical installations in spa pools are detailed in Section 9 of this Code.

### 2.29 LIGHTNING PROTECTION

Group One and Group Two aquatic facilities shall be provided with lightning protection systems in accordance with AS 1768 – 2007 – Lighting protection.

Operations Manuals and Emergency Action Plans developed in accordance with clause 7.8 of Section 7 of this Code should contain lightning protection provisions in accordance with Section 3 of AS 1768.

## SECTION 3 – CIRCULATION AND WATER TREATMENT SYSTEMS

Aquatic facility water may be contaminated by a variety of pollutants from a number of sources. There are many factors that contribute to the contaminant loading on a water body including (but not limited to) bather load, water depth, temperature and the activities for which the facility is used.

The pollutants may be accompanied by a range of micro-organisms, some of which have the ability to survive and multiply in the water and produce infections in patrons. Pollutants can also produce high levels of turbidity in the water. This can make the water aesthetically unappealing to patrons, interfere with the disinfection process and make detection of submerged patrons difficult.

Aquatic facilities require water treatment systems that can effectively remove pollutants and micro-organisms from the water. The treatment systems need the capacity to draw an adequate volume of contaminated water from the water body, efficiently remove pollutants, dose the water with the required level of disinfectant and distribute the filtered and disinfected water back through the water body.

The more heavily loaded a body of water, the more rapidly this water must be treated to remove contaminants. The “Water Body Loading Category Chart” (Table 4) is designed to establish the parameters of different levels of contaminant loading, and specifies a Maximum Permissible Turnover Time for each category of facility.

## 3.1 GENERAL REQUIREMENTS

The design of the aquatic facility and water treatment system shall be in accordance with the intended use of the facility and the anticipated bather loadings. At the time of application for approval, proponents of facilities shall nominate the required Bather Loading and proposed classification for each water body in the facility, in accordance with Table 4.

Table 5 "Water Body Parameters by Category Chart", specifies the water treatment requirements for each water body in a facility. The water treatment plant for every aquatic facility shall be designed and operated in accordance with the approved classification of the water bodies in the facility, and the requirements of Table 5.

Every aquatic facility shall be provided with a circulation system consisting of one or more pumps, piping, suction outlets, return inlets, filters, disinfectant feeders, automatic water chemistry controls and other equipment necessary to maintain the specified water quality.

The circulation system shall be designed in accordance with the following requirements:

- The capacity shall accommodate 100% of the design turnover flow rate (under clean filter conditions).
- The system shall be capable of providing effective mixing of water in the water body and uniform water quality.
- The system shall be capable of maintaining the specified disinfectant residual throughout all parts of the aquatic facility.

Aquatic facility water treatment systems shall be in operation whenever a facility is available for use, and at such additional times and periods as may be necessary to maintain the water in a clean and disinfected condition.

This requirement applies to pumps, filters, disinfectant and chemical feeders, flow indicators, gauges and all related parts of the water treatment system.

**Table 4 – Water Body Loading Category Chart**

| Category | Loading Classification | Parameters | Examples | Maximum Permissible Turnover Times |
|---|---|---|---|---|
| **1** | Spas | Spa Pools | Spa Pools, Leisure Bubble Pools | **15 mins** |
| **2** | Extreme | Very High Bather Load, Very Shallow Water | Toddlers Pool, Water Slide Splashdown Pool | **30 mins** |
| **3** | Very High | Very High Bather Load, Heated Water, Shallow Water | Shallow Leisure Pool, Hydrotherapy Pool | **1 hour** |
| **4** | High | High Bather Load, Heated Water, Moderately Shallow Water | Medium Depth Leisure Pool, Learn to Swim, Wave Pool | **1 ½ hours** |
| **5** | Moderate | High Bather Load, Heated Water, Medium Depth Water | Full Depth Heated Leisure Pool, Lazy River, Medium Depth Unheated Outdoor Leisure Pool | **2 hours** |
| **6** | Light | Medium Bather Load, Heated Water, Medium Depth Water | Heated School Pool, Health Club Pool, Body Corporate, Caravan Park, Motel Pools Full Depth Unheated Outdoor Leisure Pool | **2 ½ hours** |
| **7** | Low | Low Bather Load, Deep Water | 50m Competition Pool, Unheated Municipal/School/Motel etc Pool | **3 ½ hours** |
| **8** | Very Low | Very Low Bather Load, Very Deep Water | Diving Pool, Water Polo Pool | **5 hours** |

Example:

For Unheated Outdoor Pools, the Category/Loading Classification may be increased by one when compared to an Indoor Heated Pool with the same bather load. So, a Category 4 Pool (Heated Indoor with a High Bather Load and Moderately Shallow Water) could become a Category 5 Pool, if it was Outdoors Unheated with the same bather load and depth.

## 3.2 CIRCULATION - SUCTION AND RETURN POINTS

### 3.2.1 General Requirements

Aquatic facilities shall be provided with a surface skimmer or perimeter overflow gutter system, which shall be designed and constructed to provide effective removal of soiled surface waters.

Facilities shall be provided with return inlets and suction outlets, which are arranged to produce a uniform circulation of water throughout the facility. Where applicable, circulation equipment and controls may be installed to allow additional circulation to heavily loaded parts of a water body (eg: a beach area).

A minimum of two return inlets shall be provided for every pool, that shall be sized and installed to accommodate the flow rate required by section 3.3.2 Filtration Rates and Turnover Times. The flow rates through a single return inlet shall not exceed manufacturer's recommendations.

Where a facility is greater than 12 metres wide, or more than 280 square metres in surface area; floor inlets, or a combination of floor and wall inlets, shall be used.

Where skimmer boxes are used, the return inlets shall be of a directional design and be located to assist in bringing floating particles within range of the skimmers. Return inlets shall be installed no further than 13 metres from the nearest skimmer.

### 3.2.2 Wall Inlets

Wall Inlets shall be rounded and smooth, tamper-proof and of a design to prevent entrapment. They shall not extend further than 2.5cm from the wall.

### 3.2.3 Floor Inlets

Floor inlets shall be installed flush with the surface of the bottom of the facility, be tamper-proof and of a design to prevent entrapment.

### 3.2.4 Surface Skimmers

Surface Skimmers may be used in aquatic facilities where the water surface area does not exceed 450 $m^2$.

Surface Skimmers shall be located in an appropriate position in relation to the inlets, to maintain effective skimming action throughout the facility.

The flow rate through surface skimmers shall be *not less than* 5 litres per minute, per centimetre of skimmer weir. The flow rate through each individual skimmer shall not exceed the manufacturer's maximum specified flow rate.

Skimmer covers located on a walking surface shall be securely seated, slip-resistant, of sufficient strength to withstand normal deck use, and not constitute a tripping hazard.

At least one skimmer shall be provided for every water body. More skimmers and suction outlets shall be installed as required, to ensure adequate circulation of the water body in accordance with Table 4 -Water Body Loading Category Chart. Flow rates through skimmers and suction outlets shall not exceed the manufacturer's recommendations.

At least one skimmer shall be provided for each 13.5 $m^2$ of water body surface area. More skimmers shall be installed, if required, to ensure adequate circulation, or to meet the manufacturer's flow rate criteria.

### 3.2.5 Perimeter Overflow Systems ("Fixed Rim Skimming Device")

Perimeter overflow systems shall be used in aquatic facilities where the water surface area for an individual water body or a series of water bodies connected by the same filtration and circulation system exceeds 450 $m^2$.

Perimeter overflow systems shall be continuous around the water body. The following situations are exempt from this requirement:

- At stairs,
- At recessed ladders,
- Directly under slide flumes,
- Along weir features,
- At raised ends,
- Along planter boxes *and*
- The walls of river rides/ turbo channels.

They shall be designed with sufficient capacity to accommodate the volume of water to achieve the required turnover rate, together with any surge produced from patron activities, so that water is not permitted to flow onto the aquatic facility concourse.

All grates shall be neat and flush fitting, with no gaps between adjoining sections and no raised or buckled areas.

### 3.2.6 Entrapment Prevention

Surface skimmers and perimeter overflow gutter systems shall be designed and installed so as not to constitute a hazard to the user, and to prevent entrance or entrapment of a patron's limb, body or hair.

The requirements of AS 1926.3 – 2003, *Swimming Pool Safety, Water Recirculation and Filtration Systems shall apply to all suction outlet systems.* Furthermore the following items shall also apply:

Main drain outlets that are less than 300mm wide shall be covered with an anti-vortex grate.

Suction outlets shall not be able to be isolated, such that one outlet serves as the sole source of water to a pump.

The circulation systems of pools, spas or water recreation attractions shall not be operated if the main drain grates, or any suction outlet cover or grate is missing, broken, or insecurely fitted.

## 3.3 WATER TREATMENT

Effective water treatment requires a combination of processes working together to provide water that is safe to swim in and of optimum quality. Among these, filtration and disinfection are critical processes with specific requirements.

### 3.3.1 Filtration

Filtration is used to remove contaminants that are present in the water, either as colloidal solutions or suspended as particulate material.

The filtration system pumps soiled water through a filtration medium, which captures and retains the contaminants. The filtration medium may consist of sand, diatomaceous earth or other approved material. The captured contaminants are subsequently removed from the filter medium during a cleaning process such as backwashing.

Efficient filtration will remove a high proportion of contaminants from the water, enhancing the effectiveness of the disinfection process.

An additional role of the circulation system is to provide a continuous flow of water through the water body, to mix and evenly distribute the disinfectant chemicals throughout the water.

Filtration systems shall be designed to take into account the level of contaminants in the water, determined by factors such as the type of facility, the expected bather loading, water depth, the size of the facility, the water volume and operating water temperature.

### 3.3.2 Filtration Rates and Turnover Times

Aquatic facilities shall be provided with filtration systems appropriate to the category approved by the EDPH. Each body of water shall be equipped with a filtration system that has the capacity to achieve the turnover times set out in the "Water Body Loading Category Chart" (Table 4).

All filtration rates shall comply with the requirements as set out in the "Water Body Parameters by Category Chart" (Table 5).

**Table 5 - Water Body Parameters by Category Chart**

| Category | Maximum Peak Bather Loading (persons/$m^2$) | Minimum Water Allowance per T/Over ($m^3$/person/turn over) | Maximum Daily Bather Load (persons/$m^3$) | Maximum Sand Filter Flow Rate (L/min/$m^2$) | Maximum D.E Filter Flow Rate (L/min/$m^2$) | Maximum Cartridge Filter Flow Rate (L/min/$m^2$) |
|---|---|---|---|---|---|---|
| **1** | 1 person / 1.0$m^2$ | 10.0 | 9.6 | 400 | 60 | 12 |
| **2** | 1 person / 2.0$m^2$ | 8.0 | 6.0 | 400 | 60 | 12 |
| **3** | 1 person / 2.0$m^2$ | 7.0 | 3.4 | 400 | 60 | 12 |
| **4** | 1 person / 2.5$m^2$ | 6.0 | 3.0 | 600 | 80 | 15 |
| **5** | 1 person / 2.5$m^2$ | 5.4 | 2.2 | 600 | 80 | 15 |
| **6** | 1 person / 2.5$m^2$ | 5.0 | 1.9 | 600 | 80 | 15 |
| **7** | 1 person / 3.5$m^2$ | 4.8 | 1.4 | 700 | 80 | 15 |
| **8** | 1 person / 3.5$m^2$ | 4.8 | 1.0 | 700 | 80 | 15 |

Clause 8 at the end of this Section contains an example on the use of data from Table 4 and Table 5 to determine filtration system requirements.

### 3.3.3 Requirements for Filtration Vessels

Filtration vessels shall be designed and constructed in accordance with the following requirements:

- To achieve a uniform flow of water through the filter bed.
- To be capable of withstanding normal and continuous use without deterioration that could affect the filter or filter operation.
- To permit regular inspection and maintenance.
- To permit adequate and effective cleaning or replacement of the media, to achieve design flow rates in filter and backwash mode.
- To have corrosion-resistant components.
- Where filter vessels permit the accumulation of air in the top of the vessel housing, the filter vessel shall be equipped with an air release system, which evacuates the air automatically.
- To be installed with all necessary pressure gauges and instrumentation.
- To be clearly labelled with model, make, filter area, pressure rating and flow rates (in filter and backwash mode).

### 3.3.4 Other Requirements

Facilities shall comply with the following requirements:

- Water velocity in pipe work shall not exceed 3 metres per second in discharge piping, and 1.8 metres per second in suction piping.
- Systems incorporating manifolding shall comply with the requirements of AS 1345-1995, *Identification of the Contents of Pipes, Conduits and Ducts.*
- Filtration equipment shall be protected from tampering by unauthorised persons.
- Filtration equipment shall be mounted level on concrete or another surface, which is easily cleanable and non-absorbent.
- Plant room floors shall slope at a minimum 1:50 gradient towards a floor drainage system.
- Each filter vessel shall be installed so that it can be isolated from the recirculation system for repairs and backwashing.
- All water treatment plant shall be installed with sufficient access, to enable them to be inspected and serviced in accordance with manufacturer's specifications and safe working practices.
- Filters cleaned by backwashing shall be provided with a readily observable sight glass, installed on the waste discharge line. Sight glasses shall be of full line diameter and readily removable for cleaning.
- Facilities using cartridge filters shall be provided with a wash-down area, to enable filtration media cleaning, without creating a nuisance and whereby, the onsite disposal of waste-water is undertaken in a manner that has been approved by the local government.

### 3.3.5 Balance Tank Capacities and Personnel Accessibility

Balance tanks form an integral part of the hydraulic performance of the water treatment system.

Balance tanks shall be sized, to allow for the following:

- Bather displacement based on the maximum instantaneous load rating for the facility.
- Volume of water available to backwash all primary filters at one time.
- A reserve for start-up after backwash, freeboard and wave displacement of not less than 20% above the sum of 1 and 2.

Where entry is possible into a balance tank, it shall be designed in accordance with the requirements of the *Occupational Safety and Health Regulations 1996* (Part 3 Division 8 "Work in Confined Spaces".

### 3.3.6 Requirements for Water Features

The water supply for all water features shall consist of filtered, disinfected water obtained from the return side of the filtration system. This requirement applies to water features such as waterfalls, fountains, mushrooms, or other design features through which water enters an aquatic facility.

High water volume features (water slides, rivers etc), must draw their water from a chlorinated and filtered water supply. If any water is drawn from the balance tank directly into a water feature, all make-up water must be filtered before entering the balance tank and the balance tank water must be chlorinated to achieve a minimum level of 2 milligram per litre free chlorine.

## 3.4 DISINFECTION

The disinfection process involves adding a chemical to the water to destroy micro-organisms, and oxidise chemical pollutants. To prevent transmission of infectious diseases, it is essential that this process achieves rapid destruction of micro-organisms in the water, without harming the bathers. It is also necessary to maintain a sufficient residual disinfectant in the water to rapidly destroy any micro-organisms introduced by patrons or other sources.

Chemical disinfection processes are generally centred on a chlorine or bromine compound, as they are the most effective chemicals that can safely be used in an aquatic facility. They may be used in conjunction with a number of other chemicals or processes (such as U.V. or Ozone) to improve their efficiency and reduce the creation of disinfection by-products.

### 3.4.1 General Requirements

Aquatic facilities shall be equipped with automatic disinfectant equipment that is capable of maintaining continuous and effective disinfection of the water under all conditions of use.

The equipment shall be capable of maintaining the water chemistry in compliance with the requirements of this Code.

### 3.4.2 Design and Installation Requirements

Chemical dosing equipment shall be designed and installed to comply with the following requirements:

- Dosing pumps shall be regulated to accommodate varying supply or back pressures, and ensure the feed rate remains constant.
- Control systems with graduated and clearly marked dosage adjustments shall be provided, which are capable of providing flows from full capacity to 10% of such capacity.
- Chemicals shall not feed into the water if the pumping equipment or power supply fails.
- Operation of the system shall cease if there is inadequate flow of water through the filtration system that would prevent the chemicals from being properly dispersed throughout the aquatic facility water body.
- Water shall not be permitted to siphon from the recirculation system to the water treatment solution container. Water treatment chemicals shall not be permitted to siphon from the solution container into the water body.
- Make-up water supply lines installed on chemical solution feeder tanks shall have an air gap or other back-flow prevention device.

### 3.5 POSITIONING OF INJECTION POINTS

Uncovered gravity sand filters and cartridge filters shall have the disinfectant injection point located prior to the filter.

All other filtration systems may have the disinfectant injection point located either prior to, or after, the filters.

### 3.6 SPECIAL REQUIREMENTS FOR ELECTROLYTIC SALT CHLORINATORS

As a by-product of this process is the production of hydrogen gas, (which could accumulate in a pressure filter,) Electrolytic Salt Chlorinators shall only be installed downstream of pressure filters.

Electrolytic Salt Chlorinators shall be electrically linked to the main circulating pump, to prevent the chlorinator operating when the main circulating pump is switched off.

Where the electrolytic salt cells are not designed to be located above the filter vessel, gas detectors shall be fitted that will terminate the operation of the chlorinator in the event of a hydrogen gas build-up.

As an Electrolytic Salt Chlorinator cannot respond to instantaneous chlorine demand, a back-up automatic chlorine system shall be installed, using gas, liquid or granular chlorine.

### 3.7 SPECIFIC REQUIREMENTS FOR OZONE DISINFECTION SYSTEMS

Facilities equipped with ozone water treatment systems shall comply with the requirements in Appendix 4 of this Code.

### 3.8 SOLAR WATER HEATING SYSTEMS

Aquatic facilities are increasingly employing solar water heating systems to maximise energy usage. To prevent contamination of the water, these systems need to be designed to appropriate standards.

Solar water heating systems shall comply with the provisions detailed in Appendix 3 of this Code.

## 3.9 EXPLANATORY NOTES TO SECTION 3

**From Table 5 - Water Body Parameters by Category Chart**

| Category | Maximum Peak Bather Loading (persons/$m^2$) | Minimum Water Allowance per T/Over ($m^3$/person/turn over) | Maximum Daily Bather Load (persons/$m^3$) | Maximum Sand Filter Flow Rate (L/min/$m^2$) | Maximum D.E Filter Flow Rate (L/min/$m^2$) | Maximum Cartridge Filter Flow Rate (L/min/$m^2$) |
|---|---|---|---|---|---|---|
| **1** | 1 person / 1.0$m^2$ | 10.0 | 9.6 | 400 | 60 | 12 |
| **2** | 1 person / 2.0$m^2$ | 8.0 | 6.0 | 400 | 60 | 12 |
| **3** | 1 person / 2.0$m^2$ | 7.0 | 3.4 | 400 | 60 | 12 |
| **4** | 1 person / 2.5$m^2$ | 6.0 | 3.0 | 600 | 80 | 15 |
| **5** | 1 person / 2.5$m^2$ | 5.4 | 2.2 | 600 | 80 | 15 |
| **6** | 1 person / 2.5$m^2$ | 5.0 | 1.9 | 600 | 80 | 15 |
| **7** | 1 person / 3.5$m^2$ | 4.8 | 1.4 | 700 | 80 | 15 |
| **8** | 1 person / 3.5$m^2$ | 4.8 | 1.0 | 700 | 80 | 15 |

The above chart specifies maximum filter flow rates for aquatic facility water treatment systems. It is the maximum rate at which the water can flow through the filtration medium. Higher bather loadings (number of patrons in the water) produce higher levels of contamination in the water, such as fats, oils and other bodily wastes. To effectively remove these contaminants, the water must pass through the filtration medium at a slower rate.

The chart prescribes eight levels of filter flow rates, for varying bather loading levels. The bather loadings are linked to the facility classifications prescribed in the Water Body Loading Category Chart in (Table 4).

Bather loading levels are prescribed using a maximum peak bather loading and a maximum daily bather loading.

The maximum peak bather loading is prescribed in Column 2 of the Table, expressed as persons per $m^2$ of the surface of the water body. This can also be described as the instantaneous bather load, and represents the maximum number of people who may use the aquatic facility water body at any one time. The ratios alter according to the category of facility (as defined by Table 4) and the usual water body depths.

Column 3 is the Minimum Water Allowance per Turnover, and corresponds to the maximum number of people permitted in the water body in a 24-hour period. This loading is calculated from the volume of treated water per day, divided by a volumetric allowance per bather. The volumetric allowance varies with the Category selection and a depth factor. This is expressed in volume ($m^3$) of treated water per turnover, per person, per day.

Column 4 translates this concept into a Maximum Daily Bather Load. This value is the maximum number of patrons allowed in the water body per $m^3$ of water per day.

Columns 5-7 provide the Maximum Permissible Filtration Rate for each category of facility, for the three commonly used filter technologies. The value is expressed in litres per minute, per $m^2$ of filter bed surface area.

It should be noted that these are the maximum rates permissible. Lower filter flow rates may be stipulated by the aquatic engineer, as determined by the anticipated bather loading and water quality requirements. The turnover rates stipulated in Table 4 must be maintained at all times.

## Example 1

**Water Body Dimensions**

| | | | | | |
|---|---|---|---|---|---|
| **Area** | **250m$^2$** | **Depth** | **1.0m** | **Volume** | **250m$^3$** |

SCENARIO A

Heated Water, Indoor Pool, Medium Bather Load, Fairly Shallow Water

*Category 5* **Maximum Permissible Turnover Time 2 hr = 125m$^3$/hr**

Instant Bather Load 250m$^2$ @ 2.5m$^2$ per person = **100 persons instantaneous load**

Maximum Daily Bather Load

- Turnover = 125m$^3$/hr x 24 = 3000m$^3$/24hr
- Allowance = 5.4m$^3$/person/24hrs **555 persons per day**

……

SCENARIO B

The facility proponent requires capacity to deal with a higher daily bather load (650 persons/day).

Instant bather remains at **100 persons instantaneous load**

Maximum daily Bather load **650 persons per day**

Turnover required = 650 x 5.4 = 3510m$^3$/24hrs
= 146m$^3$/hr **1.17hr turnover required (1hr 10mins)**

This must be allowed for in design and application. Probably should apply for a *Category 4* with a turnover of **1.5hrs** which would allow **667 persons per day**

……..

SCENARIO C

The facility is designed and built for an instantaneous load of 100 persons, and a daily bather load of 555 persons per day, but regularly has bather loads of 650 persons per day.

*The facility owner will be required to decrease the turnover time as in Scenario B, or limit the number of patrons to 555 per day.*

……..

Note: In all cases, the **Instantaneous Bather Load** remains sacrosanct in design and operation.

## Example 2

**Water Body Dimensions**

| | | | | | |
|---|---|---|---|---|---|
| **Area** | **500m$^2$** | **Depth** | **0.6m** | **Volume** | **300m$^3$** |

SCENARIO A

Heated Water, Indoor Pool, Heavy Bather Load, Shallow Water

*Category 3* **Maximum Permissible Turnover Time 1 hr = 300m$^3$/hr**

Instant Bather Load 500m$^2$ @ 2.0m$^2$ per person = **250 persons instantaneous load**

Maximum Daily Bather Load
- Turnover = 300m$^3$/hr x 24 = 7200m$^3$/24hr
- Allowance = 7.0m$^3$/persons/24hrs **1028 persons per day**

……

SCENARIO B

Same Pool size but *Unheated Outdoor* Pool, Heavy Bather Load, Shallow Water

*Category 4* **Maximum Permissible Turnover Time 1.5 hr = 200m$^3$/hr**

Instant Bather Load 500m$^2$ @ 2.5m$^2$ per person = **200 persons instantaneous load**

Maximum Daily Bather Load
- Turnover = 200m$^3$/hr x 24 = 4800m$^3$/24hr
- Allowance = 6.0m$^3$/persons/24hrs **800 persons per day**

……..

SCENARIO C

Same Pool size but Unheated Outdoor Pool, *Light* Bather Load, Shallow Water

*Category 5* **Maximum Permissible Turnover Time 2.0 hr = 150m$^3$/hr**

Instant Bather Load 500m$^2$ @ 2.5m$^2$ per person = **200 persons instantaneous load**

Maximum Daily Bather Load
- Turnover = 150m$^3$/hr x 24 = 3600m$^3$/24hr
- Allowance = 5.0m$^3$/persons/24hrs **667 persons per day**

……

Note: For Scenario A (*Category 3*) the flow rate through the Filter(s) must also be slower.

# SECTION 4 – CHEMICAL SAFETY

All chemicals used to treat aquatic facility water can be hazardous, if not handled and stored properly.

Disinfectants are designed to kill micro-organisms, and in concentrated form they can be hazardous to staff and patrons.

A number of the chemicals are incompatible, and can react if mixed together. The manufacturers' Material Safety Data Sheet is a useful source of information on the storage, handling and use of chemicals.

## 4.1 CHLORINE GAS AND CHEMICAL STORAGE

Aquatic facilities are advised of the need to comply with the Explosives and Dangerous Goods Act 1961, and the Explosives and Dangerous Goods (Dangerous Goods Handling and Storage) Regulations 1992, which are administered by the Resources Safety Division of Department of Consumer and Employment Protection.

## SECTION 5 – WATER QUALITY AND TESTING

Maintaining water quality is a fundamental role in operating an aquatic facility.

The objectives of an operator should be to:

- Ensure the water is properly disinfected at all times, to prevent transmission of infectious diseases,
- Achieve maximum patron comfort, and
- Maximise longevity of the facility structure.

Whenever an aquatic facility is available for use, the water needs to contain an adequate level of a chemical that can destroy micro-organisms. By far the most common chemical used for disinfection is chlorine. This material has the advantages of being a relatively low cost, highly effective disinfectant that is readily available.

However, chlorine is also a highly reactive chemical, which non-selectively combines with nitrogen-rich pollutants in the water, to produce unwanted chemicals known as chloramines. These give the water a characteristic pungent chlorine-like smell, and irritate the eyes and skin of patrons.

Chloramines are also known to be less effective disinfectants than free chlorine. High concentrations of chloramines reduce the overall effectiveness of the chlorination process.

The chloramine problem is generally worse in heavily patronised facilities, where patrons add large amounts of urea and other nitrogen-rich bodily wastes to the water.

A number of technologies are now available to reduce the levels of chloramines in water. Examples include the use of ozone gas, ultraviolet light irradiation, and the addition of non-chlorine oxidising chemicals to the water. The use of these technologies should be considered for indoor aquatic facilities with significant bather numbers.

Chlorine also undergoes significant degradation when exposed to sunlight. The degradation is caused by the ultraviolet light component of sunlight, and can be reduced by adding cyanuric acid to the water. This chemical binds to chlorine and shields it from the ultraviolet light.

A number of studies have been performed on cyanuric acid, some of which suggest that the chemical decreases the effectiveness of chlorine, and therefore increases the disinfection time. To compensate for this effect, cyanuric acid needs to be maintained within a specific concentration range, and used in conjunction with higher levels of chlorine.

Techniques for measuring chlorine levels in water are well established. A variety of colorimetric techniques are available, using reagents and a comparator or photometer.

However, chlorine and pH levels alone are an insufficient measure of the efficacy of the disinfection process. The efficacy is determined by the activity level of the chlorine, which can be affected by a number of other factors.

The activity level of chlorine is measured by its oxidative capacity, otherwise known as the oxidation reduction potential. This parameter indicates the combined effect of all oxidising materials in the water, and is expressed in millivolts.

Systems which monitor the oxidation reduction potential and pH are becoming widespread in the aquatic industry, as they provide operators with the ability to automatically control the water chemistry.

Some indoor facilities choose to use bromine disinfectants in place of chlorine. Bromine compounds possess a number of desirable properties, including:

- Reduced breakdown of the disinfectant at higher water temperatures (heated facilities),
- Increased effectiveness of the sanitiser in water with high levels of organic contamination (produced by high bather loadings),
- Reduced patron irritation from sanitiser by-products (bromamines are less irritating than chloramines).

Bromine is most commonly used in a solid form as the chemical Bromo-chloro-dimethylhydantoin (BCDMH). The bromine and chlorine components of this substance eventually degrade to inactive bromide and chloride; however, the dimethylhydantoin (DMH) component does not break down, and accumulates in the water. Elevated levels of DMH are believed to produce skin irritation problems in patrons, and can only be reduced by dilution with fresh water on a volume by volume basis.

Bromine is not suitable for use in outdoor facilities, as it cannot be stabilised against ultraviolet light degradation.

The effectiveness of chlorine and other disinfectants is largely influenced by the pH of the water. Both chlorine and bromine lose their disinfection and oxidation capacity at higher pH levels. To ensure disinfectants achieve maximum effectiveness, it is critical that the pH of the water is maintained within a defined range.

Addition of disinfectants, which can be strongly acidic or strongly alkaline, changes the pH. Fluctuations in the pH levels can be minimised if correct alkalinity levels are maintained. The alkalinity is a measure of the ability of the water to resist changes in pH.

The appropriate alkalinity level will depend upon the type of disinfection system used, and the material used to construct the water body.

The chemicals used to disinfect the water and adjust the pH, ultimately break down to produce salt. Unless the salt level is diluted, by emptying a sufficient volume and refilling with fresh water, the salinity level will gradually rise.

The Total Dissolved Solids level (TDS) is a measure of the total quantity of salts dissolved in the water. It is advisable to prevent excessively high TDS levels from accumulating, as they may result in accelerated corrosion of metal components within the water bodies.

In addition to water chemistry, it is important to ensure physical water quality parameters are maintained.

Water clarity is often the first feature patrons notice when entering an aquatic facility. Apart from its effect on aesthetic quality, water clarity is also an important factor in providing a safe environment. Excessive levels of turbidity in water can reduce the ability of lifeguards to detect submerged patrons. The particles that produce turbidity also reduce the efficiency of the water disinfection process, by shielding micro-organisms from direct contact with disinfectants. A variety of methods are available to control turbidity levels.

Many aquatic facilities use water heating systems to facilitate patron comfort and enable the facility to be used throughout the colder months. The most appropriate operating temperature will depend on the type of facility.

Warmer temperatures are generally appropriate for facilities used for less strenuous activities such as hydrotherapy pools and spa pools, whilst lower temperatures are generally appropriate for facilities used for vigorous exercise, such as swimming training.

Higher water temperatures can cause patron discomfort, increasing perspiration and elevating levels of contamination in the water. If an aquatic facility is operated with excessively high water temperatures, and patrons stay in the water for long periods, they may suffer an elevation in body temperature, which can have serious consequences. As it is difficult to control the time patrons spend in the water, it is important to ensure water temperatures do not exceed certain limits.

It is important to regularly check the chemical and physical properties of aquatic facility water, and make adjustments where necessary. This will ensure the filtration and disinfection system is functioning correctly, and patrons are provided with maximum levels of hygiene and comfort.

## 5.1 CHEMICAL WATER STANDARDS

The water chemistry shall be maintained in accordance with the requirements of Table 6.

### 5.1.1 Free Chlorine Levels

**Table 6 – Minimum Free Chlorine Levels**

| | **Minimum Free Chlorine Levels – milligrams per litre** | |
|---|---|---|
| | **Water Temperature less than 26 $^0$C.** | **Water Temperature Greater than 26 $^0$C.** |
| Unstabilised pools – cyanuric acid not used. | 1.0 | 2.0 |
| Stabilised pools – where cyanuric acid is used | 2.0 | 3.0 |
| | **Minimum Free Chlorine Levels – milligrams per litre** | |
| Spa and hydrotherapy pools | 3.0 | |
| Wading pools | 4.0 | |

As an alternative to complying with this requirement, indoor facilities may comply with the free bromine levels specified in 5.1.4 *Free Bromine Levels* of this Section.

### 5.1.2 Combined Chlorine Levels

It is recommended that facilities be operated with combined chlorine levels no greater than 30% of the Free Chlorine Levels.

### 5.1.3 Maximum Chlorine Levels

Total chlorine levels shall be no greater than 10 milligrams per litre whilst a facility is in use.

### 5.1.4 Free Bromine Levels

Facilities electing to use bromine sanitisers shall ensure the water complies with the requirements of Table 7.

**Table 7 – Minimum Free Bromine Levels**

| | **Minimum Free Bromine Levels (milligrams per litre)** | |
|---|---|---|
| **Type of Facility** | **Water Temperature Less than 26 $^0$C.** | **Water Temperature Greater than 26 $^0$C.** |
| Swimming Pools, Wave Pools, Water Slide Receiving Pools | 2.0 | 4.0 |
| Hydrotherapy Pools, Spa Pools and Wading Pools | 4.0 | 6.0 |

Facilities using bromine as a sanitiser shall keep the DMH levels no greater than 200 milligrams per litre.

### 5.1.5 pH

The pH shall be maintained within the range 7.2 – 7.8, except where bromine is used as a sanitiser wherein, the pH shall be maintained within the range 7.2-8.0.

### 5.1.6 Cyanuric Acid

Where cyanuric acid is used, it is to be maintained at a level of 30 – 50 milligrams per litre.

### 5.1.7 Alkalinity

The alkalinity shall be maintained within the range 60 – 200 milligrams per litre.

### 5.1.8 Calcium Hardness

The calcium hardness shall be maintained within the range 50-400 milligrams per litre.

### 5.1.9 Total Dissolved Solids

It is recommended that the Total Dissolved Solids (TDS) level be maintained at no more than 1000 milligrams per litre above the TDS level of the supply water, to an absolute maximum of 3000 milligrams per litre.

Facilities using salt water chlorination units shall maintain the TDS level in the range specified by the chlorination unit manufacturers.

### 5.1.10 Water Balance

It is recommended that operators ensure water is balanced in accordance with the Langlier Saturation Index, Taylor Index or other appropriate saturation index. Information on water balance is contained in Appendix 7 of this Code.

## 5.2 PHYSICAL WATER STANDARDS

Aquatic facility water needs to be maintained to appropriate physical standards, to provide patrons with a comfortable and safe environment, and to ensure the disinfection process works efficiently.

### 5.2.1 Water Clarity

Aquatic facility water shall be kept clean and clear.

The water shall be maintained to a level of clarity that will allow a Secchi Disk 150mm in diameter, placed on the bottom of the deepest part of the water body, to be visible when viewed from the concourse at a distance of 9 metres.

Whenever a facility is open for use, the water shall have sufficient clarity to enable lifeguards to see a submerged patron on the bottom of the water body.

This requirement shall be applied to measurements conducted on waterslide landing pools without the flume water flow operating.

### 5.2.2 Maximum Water Temperatures

Aquatic facility water bodies shall not be heated above 38 $^{0}$C.

## 5.3 MICROBIOLOGICAL WATER STANDARDS

All aquatic facility water shall be maintained in accordance with the microbiological requirements of Table 8.

**Table 8 – Microbiological Water Standards**

| Type of Organism | Maximum Count Allowable |
|---|---|
| Heterotrophic Plate Count | 100 Colony Forming Units (CFU) per mL. |
| Presumptive Total Coliforms | <1 per 100 mL |
| Presumptive *Pseudomonas spp*<br>(Only applies where water temperature is over 32 $^{0}$C) | <1 per 100 mL |
| Thermophilic Amoebae | Not Detected |
| Thermophilic *Naegleria* | Not Detected |

All make-up water used in aquatic facilities shall also comply with this requirement.

## 5.4 CHEMICAL WATER TESTING

Whenever an aquatic facility is open for use, the water chemistry shall be manually tested on a regular basis.

The water testing shall include measurement of the following parameters:

- Free chlorine / Free bromine
- pH

The testing shall be performed in accordance with the following minimum frequencies:

- Group One Facilities: At least once every four hours
- Group Two and Group Three Facilities: At least three times per day
- Group Four Facilities: At least once per day

All facilities using isocyanuric acid shall perform water tests to measure the concentration of the chemical, at least once per week.

Results of all water testing and maintenance procedures shall be recorded, and records kept by the facility for at least two years. The occupier of a facility shall produce the records for examination at the request of an Environmental Health Officer.

All chemical water tests are to be performed using water testing kits approved by the Executive Director Public Health. Approved testing kits are listed below:

- Palintest Comparators;
- Palintest Photometers;
- Lovibond Comparators;
- Lovibond Photometers.

Test kit reagents shall be stored in accordance with manufacturers' directions, and discarded upon reaching their expiry date.

## 5.5 OFF-SEASON PERIODS - WATER QUALITY MAINTENANCE

During the off-season, whilst an aquatic facility is not in use, operators shall ensure water clarity is maintained and algal growth prevented.

Signage must be displayed at all entry points into aquatic facilities, clearly stating that the facility is closed for the winter, or words to similar effect regarding off-season closure.

Aquatic facilities shall receive sufficient maintenance to ensure they do not give off objectionable odours, become a breeding ground for insects, or create any other nuisance or safety hazards.

Maintenance of other water quality parameters is not required during the off-season.

At the end of an off-season period, occupiers shall seek approval from the Environmental Health Service of the local government in which the aquatic facility is located, prior to a facility being re-opened for use.

# SECTION 6 – QUALIFICATION REQUIREMENTS FOR AQUATIC FACILITY OPERATORS, SUPERVISORS AND EMERGENCY CARE PERSONNEL

This Section defines management requirements for operation, supervision and emergency care using the aquatic facility classification defined in Section 1.

Aquatic facilities vary in their size, design, and patron characteristics. It is essential that aquatic facility management and staff possess qualifications and skills that enable them to effectively operate the facility, supervise and control users and provide adequate emergency care.

Management is expected to be able to carry out all required tasks, including operation of the filtration plant and equipment, maintaining water quality, general upkeep and maintenance of the facility.

Management is responsible for ensuring the facility implements adequate measures to supervise all patrons. A lifeguard service providing effective supervision of patrons, can prevent drowning, and is essential in higher-risk facilities. It is important that lifeguards hold suitable, current qualifications and skills. Lifeguards must be able to provide supervision at all times, and not be allocated duties that could interfere with their ability to respond immediately to an emergency.

It is also important for higher-risk facilities to have qualified personnel on the premises, who are able to carry out emergency care, until the casualty recovers or is transferred to the care of a paramedical or medical professional.

Group Three and Group Four facilities that do not provide a lifeguard service are required to implement other measures, to reduce the risk to bathers. Examples of such measures include providing qualified instructors, controlling patron usage, or informing patrons of the need to arrange their own supervision.

In circumstances where a facility is operated and supervised by one person, that person will need to comply with all the qualification requirements that apply to that facility. In circumstances where a facility is operated and supervised by a team of personnel, the qualification requirements may be satisfied by the collective qualifications held by individual team members.

## 6.1 INTERPRETATION

All Units of Competence listed in this Section are sourced from the National Community Recreation Industry Training Package (SRC99), published by the Australian National Training Authority.

References to "approved" shall be construed as meaning "approved by the Executive Director Public Health".

For the purposes of this Section of the Code, provisions in the Pool Safety Guidelines incorporating the word "should" shall be construed as mandatory requirements.

## 6.2 QUALIFICATION REQUIREMENTS

### 6.2.1 Group One Facilities

The operator of a Group One facility of Group One facility shall ensure that whenever the facility is open or available for use by the public, personnel are on the premises that hold qualifications in Technical Operations, Patron Supervision and Emergency Care, as detailed below.

#### 6.2.1.1 Technical Operations

Each technical operator of a Group One facility shall have completed an approved training program. Currency of practice will be demonstrated by maintaining accreditation with the Leisure Institute of Western Australia (Aquatics). The Accreditation Certificate is to remain at the Aquatic Facility and made available, when requested by an Environmental Health Officer. The accreditation process will require individuals to meet the following criteria every three years, and hold the following:

1. Evidence of successful completion of a recognised pool operators' training course.
2. A current Senior First Aid Certificate, or equivalent.
3. A current Pool Lifeguard Award, or equivalent.
4. Details of current and past employment in the aquatic industry.
5. Evidence of attendance at two professional development seminars over the three-year period.

An approved training program shall consist of the following units of competency, or equivalent:

SRC AQU 001B Monitor Pool Water Quality.
SRC AQU 002B Operate Aquatic Facility Plant and Equipment.
SRC AQU 004B Maintain Pool Water Quality.
SRC AQU 005B Implement Aquatic Facility Plant and Equipment Maintenance Program.
SRX OHS 001B Follow Defined Occupational Health and Safety Policies and Procedures.
SRX EMR 002A Coordinate Emergency Response.
SRX RIK 001A Undertake a Risk Analysis of Activities.
SRC AQU 018A Operate Self-Contained Breathing Apparatus in an Aquatic Facility.

Participants shall be assessed and re-assessed in accordance with Guideline TO 1.07 – *Accreditation for Pool Plant Operators - 2003*from the Pool Safety Guidelines.

#### 6.2.1.2 Patron Supervision

Group One facilities shall be provided with lifeguards who have completed an approved training program. Currency of practice shall be demonstrated by holding a valid Royal Life Saving Society Australia, Pool Lifeguard award, or approved equivalent. This award shall be updated every 12 months.

The training program shall consist of the following units of competency, or equivalent:

SRC AQU 003B Respond to an aquatic emergency using basic water rescue techniques.
SRC AQU 006B Supervise clients at an aquatic facility or environment.
SRC AQU 007B Respond to aquatic emergency using advanced water rescue techniques.

Participants shall be assessed and re-assessed in accordance with Guideline SU 1.03 – *Assessment Criteria for Accreditation for Pool Lifeguards - 2003* from the Pool Safety Guidelines.

#### 6.2.1.3 Emergency Care

Group One facilities shall be provided with emergency care personnel who have completed an approved training program. Currency of practice shall be demonstrated by holding a valid Senior First Aid Certificate, or approved equivalent. This certificate shall be updated every 3 years.

The training program shall consist of the following units of competency, or equivalent:

SRX FAD 002A Provide Advanced First Aid Response, or;
HLTFA 1A Basic First Aid.

Participants shall be assessed and re-assessed in accordance with Guideline FA 1.06 – *Accreditation for First Aiders - 2003* from the Pool Safety Guidelines.

### 6.2.2 Alternative Compliance Provisions – Group One Facilities

#### 6.2.2.1 Existing Qualifications

Each technical operator of Group One facility who hold qualifications approved prior to the introduction of this Code, shall be deemed to satisfy the requirements of this Section for the 3 years following the commencement of the Code. Such persons shall be required to obtain Leisure Institute of Western Australia (Aquatics) Accreditation, or approved equivalent within three years of the commencement of this Code.

#### 6.2.2.2 Collective Use of Staff Qualifications

A Group One facility operated and supervised by a team of personnel may satisfy the qualification requirements by the collective qualifications held by individual team members.

The operator of such a facility shall ensure sufficient staff members who collectively hold qualifications that satisfy the requirements of this Section, are on the premises whenever the facility is open or available for use.

### 6.2.3 Special Requirements for Waterslides

Waterslide landing pools and flume exits shall be supervised by personnel holding Emergency Care qualifications as listed in 6.2.1.3 above. A competent person shall supervise the flume entrance of the waterslide.

### 6.2.4 Group Two Facilities

The operator of a Group Two facility shall ensure that the facility is operated and maintained by personnel who hold qualifications in Technical Operations, Patron Rescue and Emergency Care, as listed below.

The operator shall ensure that personnel holding qualifications in Participant Supervision and Emergency Care are on the premises whenever the facility is open or available for use.

#### 6.2.4.1 Technical Operations

Each technical operator of a Group Two facility shall have completed an approved training program. The training program shall consist of the following units of competency, or equivalent:

SRC AQU 001B Monitor pool water quality.
SRC AQU 002B Operate aquatic facility plant and equipment.
SRC AQU 004B Maintain pool water quality.
SRX OHS 001B Follow Defined Occupational Health and Safety Policies and Procedures.

#### 6.2.4.2 Participant Supervision

Group Two facilities shall be provided with program supervisors who have completed an approved training program.

Currency of practice shall be demonstrated by holding a valid Royal Life Saving Society Australia, Aquatic Rescue Award or Swimming Teacher Rescue Award, or approved equivalents, or higher. This qualification shall be re-assessed annually.

The training program shall consist of the following units of competency, or equivalent:

SRC AQU 003B Respond To An Aquatic Emergency Using Basic Water Rescue Techniques

Participants shall be assessed and re-assessed in accordance with Guideline PR 1.12 – *Accreditation for Aquatic Rescue Award - 2003* from the Pool Safety Guidelines.

#### 6.2.4.3 Emergency Care

Group Two facilities shall be provided with emergency care personnel who have completed an approved training program. Currency of practice shall be demonstrated by holding a valid Senior First Aid Certificate, or approved equivalent qualification. This Certificate shall be updated every 3 years.

The training program shall consist of the following units of competency, or equivalent:

SRX FAD 002A Provide Advanced First Aid Response, or;
HLTFA 1A Basic First Aid.

Participants shall be assessed and re-assessed in accordance with Guideline FA 1.06 – *Accreditation for First Aiders* from the Pool Safety Guidelines.

### 6.2.5 Group Three Facilities

The operator of a Group Three facility shall ensure that the facility is operated and maintained by personnel who hold qualifications in Technical Operations, Patron Rescue and Emergency Care, as listed below.

The operator shall ensure that personnel holding qualifications in aquatic rescue and emergency care are on the premises whenever the facility is open or available for use. However, such personnel are not required to provide supervision of patrons at all times.

#### 6.2.5.1 Technical Operations

Each technical operator of a Group Three facility shall have completed an approved training program.

The training program shall consist of the following units of competency, or equivalent:

SRC AQU 001B Monitor pool water quality.
SRC AQU 002B Operate aquatic facility plant and equipment.
SRC AQU 004B Maintain pool water quality.
SRX OHS 001B Follow Defined Occupational Health and Safety Policies and Procedures.

#### 6.2.5.2 Patron Rescue and Emergency Care

Whenever a Group Three facility is open or available for use, there shall be a person on the premises who has completed an approved training program.

Currency of practice shall be demonstrated by holding the following qualifications:

- Royal Life Saving Aquatic Rescue Award, or approved equivalent. This certificate shall be updated every 12 months, *and*
- Essential First Aid Certificate, or approved equivalent. This certificate shall be updated every 3 years.

The training program shall consist of the following units of competency:

SRC AQU 003B Respond to an aquatic emergency using basic water rescue techniques.
SRX FAD 001A Provide First Aid

Participants shall be assessed and re-assessed in accordance with Guidelines PR1.12 – *Accreditation for Aquatic Rescue Award - 2003* and FA 3.06 – *Accreditation for First Aiders - 2003* from the Pool Safety Guidelines.

### 6.2.6 Group Four Facilities

The operator of a Group Four facility shall ensure that the facility is operated and maintained by personnel who hold qualifications in Technical Operations, as listed below.

#### 6.2.6.1 Technical Operations

Each technical operator of a Group Four facility shall have completed an approved training program.

The training program shall consist of the following units of competency:

SRC AQU 001B Monitor pool water quality.
SRC AQU 002B Operate aquatic facility plant and equipment.
SRC AQU 004B Maintain pool water quality.
SRX OHS 001B Follow Defined Occupational Health and Safety Policies and Procedures.

#### 6.2.6.2 Patron Supervision and Emergency Care

Group Four facilities are not required to provide patron supervision or emergency care personnel.

### 6.3 EVIDENCE OF QUALIFICATIONS

Operators of aquatic facilities that are required by this Section to provide qualified technical operators or supervisors, shall ensure that copies of such personnel's qualifications are kept on-site at the aquatic facility, and made available when requested by an Environmental Health Officer.

### 6.4 ALTERNATIVE SUPERVISION ARRANGEMENTS

This Section requires certain aquatic facilities to provide qualified supervisors.

Such facilities shall be deemed to comply with these requirements where patrons are taking part in specific aquatic activities, and are supervised by coaches or instructional staff holding qualifications in accordance with provision 12 of Section 7 of this Code.

## SECTION 7 – GENERAL SANITATION AND OPERATIONAL REQUIREMENTS

Aquatic facilities are continuously subjected to contamination.

The main source of contamination is material brought into the water by patrons. This includes bodily fluids and solids, urine, nasal mucus, saliva, sweat, hair, skin and faecal matter. Other contaminants include dirt collected on the body before bathing, dirt on patrons' feet from the concourse, unclean bathing costumes, cosmetics, oils, hairspray, lotions and sunscreen.

A variety of contaminants may also be found in the replacement (make-up) water, and in run-off from rainwater and the environment.

Although these materials are pollutants in themselves, they may also be accompanied by a variety of micro-organisms. Some of these micro-organisms may be transmitted to patrons, where they can produce a range of infections. Strategies need to be implemented to minimise the risk of infections from these micro-organisms.

Many pollutants can be removed or inactivated by effective operation of the filtration system, and maintaining appropriate water chemistry and clarity standards.

Implementing patron hygiene and behaviour rules, including exclusion of persons who are unclean or carrying obvious infectious diseases, reduces the amount of contaminants entering the facility.

Regular servicing and maintenance of the water treatment system, along with other equipment and structures, will ensure all equipment is functioning at maximum efficiency.

Structured cleaning programs assist in preventing the build up of micro-organisms.

Operations manuals provide a useful tool for ensuring aquatic facility operators have access to information required to run a facility. Emergency Action Plans allow operators to access important information without delay when emergencies arise.

Animals can be a significant source of contamination and, therefore, are not permitted to enter water bodies.

Automatic cleaners are used to improve cleaning efficiency. Inappropriate use of this equipment can create a number of hazards to aquatic facility patrons.

Exposure of patrons to excessive chemical levels can be prevented by ensuring chemicals are not added directly to water bodies whilst facilities are in use. **All chemicals must be added prior to or post-filtration.**

Controls need to be developed for the conduct of specific activities, and only staff with appropriate qualifications shall be involved in instruction or coaching to facilitate that activity. Young children are not allowed to enter an aquatic facility unless accompanied by an adult.

Towels and bathing costumes pick up a variety of micro-organisms and other contaminants when used by patrons. Some facilities operate hire services, resulting in towels and bathers being used by a number of patrons. This practice can result in infectious micro-organisms being transferred between patrons. An approved process of cleaning must be implemented to prevent incidences of cross-infection that can result from this practice.

## 7.1 CLEANING AND MAINTENANCE REQUIREMENTS

All parts of an aquatic facility shall be maintained in good repair and in a sound working condition. All parts of an aquatic facility shall be maintained in a clean and sanitary condition, free of litter and vermin, to prevent the transmission of infectious disease.

These requirements apply to all parts of an aquatic facility, including associated plant, fixtures and equipment.

## 7.2 AUTOMATIC ELECTRIC CLEANER SAFETY

Automatic electric cleaners shall not be used, or be left in the water, whilst an aquatic facility is open for use.

## 7.3 HEAT BLANKET SAFETY

Aquatic facilities that use heat blankets shall use them in accordance with the requirements of Guideline GO 1.05 – *Pool Covers - 1996* of the Pool Safety Guidelines. For the purposes of this Clause, provisions incorporating the word "should" shall be construed as mandatory requirements.

## 7.4 ELECTRICAL SAFETY

General Power Outlets installed around the concourse shall not be used to power equipment whilst people are in the water. Electrical equipment powered by mains supply shall only be used on dry surfaces.

Residual current devices, cord extension sets and any portable or mobile electrical equipment shall be tested at six month intervals by an appropriately licensed electrical worker, in accordance with the tests prescribed by AS 3760 – 2003: In-service safety inspection and testing of electrical equipment. Where facilities operate on a seasonal basis, only one test is required prior to the start of each season.

Faulty electrical equipment shall be immediately withdrawn from use, or isolated for repair.

## 7.5 HAND DOSING OF CHEMICALS

Hand dosing, or the introduction of chemicals directly into the water body, shall not occur when the water body is occupied by patrons/ bathers.

## 7.6 PROHIBITION OF ENTRY INTO WATER BODY

The following persons are not to be permitted to enter a water body of an aquatic facility, a person who is:

(a) suffering from any gastrointestinal disease, skin infection or other disease that is communicable in an aquatic environment; or
(b) in an unclean condition; or
(c) wearing unclean clothes; or
(d) under the apparent influence of alcohol, drugs or alcohol and drugs; or
(e) a baby or young child who ordinarily wears a nappy – not wearing an aqua nappy.

Subclause (a) does not apply to a person who has a written statement by a medical practitioner to the effect that the person will not be a health hazard to other users of the water body.

## 7.7 PROHIBITION OF ANIMALS

Any animal belonging to a person, under his or her control is not to be permitted to enter or remain in an aquatic facility. The following exceptions apply:

(a) a guide dog; or
(b) a dog trained to assist the person in activities where hearing is required; or
(c) any other animal trained to assist the person to alleviate the effect of a disability the person has;

However no animal is to be permitted to enter the water body.

## 7.8 OPERATIONS MANUALS AND EMERGENCY ACTION PLANS

Group One, Two and Three aquatic facilities shall establish an operations manual and an emergency action plan. The operations manual shall be prepared in accordance with section Guideline GO1.01 - *Operation Manuals - 1996* of the Pool Safety Guidelines. The emergency action plan shall be prepared in accordance with section Guideline GO1.02 – *Emergency Action Plans - 1996* of the Pool Safety Guidelines. For the purposes of this section of the Code, provisions of the Guidelines incorporating the word "should" shall be construed as Code requirements.

## 7.9 MINIMUM ENTRY AGE

The operator of an aquatic facility shall ensure that children under 10 years of age are not permitted to enter the facility unless under the supervision of a person 16 years or older, in accordance with Guideline SU 1.11 – *Parental Supervision - 1996* of the Pool Safety Guidelines. Waterslides are exempted from complying with 4.2 of this guideline. For the purposes of this Clause, provisions incorporating the word "should" shall be construed as mandatory requirements.

## 7.10 SUPERVISION REQUIREMENTS

For Group One facilities, the minimum ratio of supervision shall be 1 lifeguard for up to 100 patrons in the water in accordance with section 4.4, *Ratios*, contained within Guideline SU 1.01 – *Bather Supervision - 1996* of the Pool Safety Guidelines.

Supervisors of Group One and Group Two facilities shall be located in a position to maintain supervision of the water. Supervisors shall not be assigned duties that would distract them from supervising patrons or program participants at all times, or inhibit their ability to provide immediate assistance to patrons or program participants in distress.

Group Three and Group Four facilities are not required to ensure patrons engaging in aquatic activities are supervised.

## 7.11 OPERATION OF DIVING FACILITIES AND STARTING PLATFORMS

Diving facilities shall be operated in accordance with Guideline SU 1.13 – *Supervision of Diving Towers and Springboards - 1996* of the Pool Safety Guidelines.

Starting platforms shall be operated in accordance with clauses 5.2 and 5.3 of Guideline SU 1.*23 Safe Diving for Competitions - 2002* of the Pool Safety Guidelines.

For the purposes of this Clause, provisions incorporating the word "should" shall be construed as mandatory requirements.

## 7.12 QUALIFICATIONS OF COACHING AND INSTRUCTIONAL STAFF

The operator of an aquatic facility shall ensure that personnel providing instruction in specific aquatic activities hold an appropriate and approved qualification, as detailed in Table 9.

**Table 9 – Qualifications of Coaching and Instructional Staff**

| Aquatic Activity | Approved Industry Standard or Approved Equivalent |
|---|---|
| Swimming and Water Safety Instruction | ▪ Royal Life Saving Instructor of Swimming and Water Safety Certificate *or*<br>▪ AUSTSWIM Teacher of Swimming and Water Safety |
| Competitive Swimming Coaching | Australian Swimming Coaching Qualification |
| Platform and Springboard Diving | Australian Diving Association Coaching Qualification |
| SCUBA Diving | Dive instructor qualification from a recreational scuba training organisation. |
| Aqua-Exercise | Australian Fitness Association Council Aqua-Exercise Leaders Certification |
| Hydrotherapy | Registered Physiotherapist |

### 7.13 TOWEL AND BATHING COSTUME HIRE

Loan or hire of bathing costumes shall comply with the requirements of the Health (Cloth Materials) Regulations 1985. These Regulations require the items to be subject to an approved process of cleaning, between each hire or loan to the public.

Under this Code, similar requirements apply to the hire and loan of towels. Towels which are hired or loaned to members of the public shall be subjected to an approved process of cleaning, before each hire or loan to the public.

### 7.14 MAXIMUM BATHER NUMBERS

The operator of an aquatic facility shall ensure that the number of patrons in an aquatic facility water body does not exceed the following levels as detailed in Table 10.

**Table 10 – Maximum Bather Numbers**

| Type of Facility | Maximum Bather Numbers at any time (persons/$m^2$ of water) |
|---|---|
| Spa pool | 1 person / 1.0$m^2$ |
| Toddler Pool, Waterslide Splash Down Pool, Leisure Pool, Hydrotherapy Pool | 1 person / 2.0$m^2$ |
| Learn to Swim Pool, Wave Pool, Lazy River, School Pool, Health Club Pool , Strata Titled Pool, Caravan Park Pool, Motel and Hotel Pool | 1 person / 2.5$m^2$ |
| 50m Competition Pool, 25m Lap Pool, Diving Pool, Water Polo Pool | 1 person / 3.5$m^2$ |

## SECTION 8 – REQUIREMENTS FOR SPECIAL FEATURES

Diving is an inherently dangerous activity that can produce serious injuries if not performed under safe conditions.

Forces sufficient to crush the cervical spine are generated at a water impact speed of only 1.22 metres per second. Studies have shown that people diving from a 1-metre board can reach water entry velocities of 6.1 to 6.71 metres per second.

The majority of spinal and head injuries have been found to occur as a result of divers impacting with the bottom of the pool. Therefore, it is important that diving facilities are designed to provide a sufficient depth of water, together with adequate clearance around the diving boards, diving platforms and the water entry zone.

Inexperienced people, using unsafe diving techniques, have also been associated with a significant number of injuries. Management and supervision plays a crucial role in preventing diving injuries.

Moveable booms are used in the aquatic industry as dividing barriers, to enable larger pools to be operated as two or more smaller pools. The booms are most commonly used to divide 50 metre pools into two 25 metre facilities. The devices can present special hazards if improperly designed or constructed.

A number of modern aquatic facilities are being designed with child amusement devices, to increase their appeal to families with younger children. Although the devices increase the recreational value of facilities, they can present a number of hazards if not properly designed and constructed. Hazards include possible entrapment and injury to young children, harbouring of micro-organisms, and interference with water circulation systems.

Wave pools are specialised, complex facilities, designed to imitate the wave action found on natural beaches. To provide a safe environment, these facilities need to be designed, constructed and operated under special conditions.

## 8.1 DIVING FACILITIES

Diving pools shall provide a sufficient depth of water to safely break the fall of a diver. The facility shall allow divers to reduce their velocity in a safe manner, to prevent injuries created by excessive deceleration forces.

Diving boards, diving platforms and diving pools shall be designed and constructed in accordance with the requirements of sections FR 5.1 – 5.3 in the FINA Constitution and Rules 2001-2002.

Access stairways and ladders shall be designed and constructed in accordance with Appendix 5 of this Code.

## 8.2 MOVEABLE BOOMS

Moveable booms shall be designed and constructed in accordance with Guideline FD 1.07 – *Moveable Booms - 1996* of the Pool Safety Guidelines. For the purposes of this Clause of the Code, provisions of the Guidelines incorporating the word "should" shall be construed as mandatory requirements.

## 8.3 CHILD AMUSEMENT DEVICES – LEISURE POOLS

Child amusement devices shall be designed and maintained with smooth, non-toxic, easily cleanable surfaces, and not pose a safety or health hazard to bathers.

The devices shall not interfere with water circulation or disinfection, or obscure supervision of patrons in the water.

## 8.4 WAVE POOLS

The generation of waves more than 900mm in height shall not continue for more than 15 minutes at a time.

An emergency shut-off system shall be provided for control of the wave action.

An audible warning system shall be provided to alert bathers of the beginning of wave generation.

The facility shall only be used if the main drain is clearly visible from the deck, with the wave generating equipment in operation.

Bathers shall obtain access to the wave pool at the shallow or beach end. Side entry to the wave pool shall be prevented by the use of a fence or other barrier.

Handholds shall be provided at the static water level. These handholds shall be self-draining, and shall be installed so that their outer edge is flush with the pool wall. The design of the handholds shall ensure that body extremities will not become entangled during wave action.

Stepholds and handrails shall be provided at one or more locations along the wall of the wave pool.

The stepholds and handrails shall extend down the wall so they will be accessible during wave generation at the lowest water level.

The distance between the handrail and the wall shall not exceed 15mm.

## 8.5 RIVER RIDES

River Rides are designed to imitate the flow of water found in natural rivers. To provide a safe environment, these facilities need to be designed, constructed and operated under the following conditions:

- Handrails, steps, stairs and booster inlets for river rides shall not protrude into the river feature.
- An approved method of exit shall be provided not less than every 60 metres along the river.
- The design velocity of the water in a river ride shall not exceed 3.2 kilometres per hour.

# SECTION 9 – PUBLIC SPA POOLS

**APPLICATION**

Public Spa Pools shall comply with the requirements of AS 2610.1 – 1993, Spa pools Part 1: Public spas, except for 2.11(a) of AS 2610.1 where compliance with Table 4 – Water Body Loading Category Chart (Section 3 Aquatic Facilities Code) is required.

When the surface area of the spa pool is less than 10 square metres, the conditions of AS 2610.1 – 1993, clause 2.5 shall not apply, however, clause 2.19.2 shall apply.

# SECTION 10 – SPECIAL REQUIREMENTS FOR WATERSLIDES

**APPLICATION**

Water Slides are amusement devices as defined in Australian Standard AS 3533 – 1997 *Amusement rides and devices*.

## 10.1 STRUCTURAL ADEQUACY

The design of waterslides, and all materials used, shall comply with structural engineering practices and requirements. Structural engineering certification shall be provided for both the design phase, prior to approval to construct and also the installation, prior to issuing the certificate of compliance.

Waterslides shall be constructed with a durable structure, and be capable of carrying loads in excess of the number of persons that would normally be in the flume. The structure shall be capable of sustaining the most adverse combination of loads.

## 10.2 FLUME (SLIDE) DESIGN AND CONSTRUCTION

### 10.2.1 General Considerations

Waterslides shall be designed to ensure maximum safety.

All materials used for construction shall be durable, water resistant, easily cleaned and maintained.

The flume shall be designed to take into account human size, weight and movement, to ensure that the rider stays within the pre-determined design path of the flume and cannot be thrown out of the flume.

All 'user contact' surfaces shall be assembled, arranged and finished smooth to prevent bodily injury or abrasion to the riders.

Flume path design shall have a configuration to ensure that under normal use, rider speeds will be maintained within the intended design range.

The flume exit configuration shall provide the rider with a safe deceleration from the ride speed to zero velocity in the landing area.

All water should be contained within the flume and landing pool area. Where water leakage and 'splash out' from the flume and landing pool occurs, suitable drainage and protection from under structure erosion is required.

### 10.2.2 Curves and Turns

The manufacturer shall demonstrate, or provide evidence to illustrate/certify that the angle of curves and turns has been considered with respect to public health and safety.

Sharp turns in quick succession shall be avoided, especially in conjunction with accelerator drops.

Attention shall be given to location and radius of bends and drops in areas of high speed.

Flumes shall be designed to minimise rider impact with the walls.

Curved portions of the flume shall be banked, so that riders are retained safely inside the flume under all foreseeable circumstances of operation.

All undulations, turns, drops and other configurations shall be provided with smooth transitions to minimise impacts.

### 10.2.3 Angle of Descent

Optimal descent rates shall be in accordance with slide specifications. The manufacturer shall demonstrate, or provide evidence to illustrate/certify that the angle of descent has been considered with respect to public health and safety.

### 10.2.4 Speed

The manufacturer shall demonstrate, or provide evidence to illustrate/certify that the slide speed has been considered with respect to public health and safety.

### 10.2.5 Tube Diameter

The diameter of the tube shall be in accordance with the design criteria of the slide.

The manufacturer shall demonstrate, or provide evidence to illustrate/certify that the tube diameter has been considered with respect to public health and safety.

### 10.2.6 Point Of Entry

All waterslides shall be equipped with a system to regulate entry of patrons into the flume.

Handrails/griprails shall be designed to reduce risk to the rider, especially to hands or other body parts.

### 10.2.7 Fibreglass

Where a flume is constructed of fibreglass, it shall be manufactured with a UV stabilised gel coat on the outer tube layer, and an acid-resistant 'sanitary grade' gel coat on the inner tube layer.

The gel coat should be an 'iso NPG' (pool grade) gel coat.

### 10.2.8 Drainage

Adequate drainage shall be provided at the base of the structure to ensure that any spillages over the sides of the flume are quickly drained to grass areas or floor drains.

## 10.3 FLUME EXIT TO LANDING POOL

### 10.3.1 General Design

The flume discharge section shall be graded in such a manner so as to reduce risk to the rider on discharge into the landing pool.

The flume exit shall be designed to minimise risk of injury from riders falling back onto the flume on discharge (eg bull nosed lip, rubber compounds, covers etc).

### 10.3.2 Point of Exit

All flume sections shall be constructed to meet the design performance criteria. The designer shall specify/certify to the approving authority that the flume exit section has been considered with respect to public health and safety.

### 10.3.3 Clearance

The flume shall have adequate clearance from obstructions on each side to prevent rider collisions.

Multiple flumes shall have an adequate clearance between flumes.

## 10.4 LANDING POOL

### 10.4.1 General Design

The landing pool should be:

- Either a designated or marked-off area (that will reduce risk to the rider or pool user), or preferably, a dedicated pool for water slide use only, whilst the slide is in use.
- Clear of obstructions over the adequate stopping distance of a rider. The stopping distance is to be designated in the slide parameters.
- Free from any pool grates or drains within the landing area.

Exit points from the landing pool shall be clearly marked/labelled.

The internal surfaces of the landing pool shall be smooth, free of sharp edges and slip resistant.

Wall and floor junctions shall be rounded to a radius of 150 – 300mm.

Pool coping shall be rounded, and constructed from non-slip materials, enabling them to be used as a hand-hold by riders in the pool.

### 10.4.2 Wall and Floor Colour

The colour of wall and floor finishes shall be no darker than the colours listed in Appendix 1, as defined by AS 2700.

Prior to construction commencing, samples of the proposed landing pool colour/s shall be submitted to the appropriate authority for approval.

## 10.5 ACCESS LADDERS AND STAIRWAYS

All flume access ladders and stairways shall comply with Appendix 5 of this Code.

## 10.6 WATERSLIDE OPERATION - SAFE RIDER SPEEDS

Qualified, competent and other responsible personnel, who supervise, or have overall responsibility for a waterslides operation, shall have in place policies and procedures that demonstrate they have considered the following factors influencing rider descent speeds, when supervising, or operating waterslides to ensure their safe operation:

### 10.6.1 The Angle of the Flume Descent

Increased flume descent angles increase rider speeds.

### 10.6.2 The Quantity of Water Flow on the Flume

Increasing the water flow rate tends to slow larger and heavier riders down, but can have the opposite effect on small children of lesser body weight, thus providing a moderating effect on sliding speed.

### 10.6.3 Body Weight

Body weight has a direct bearing on rider speeds.

- Heavier riders tend to travel faster than lighter riders.
- This factor must be taken into account when determining time intervals between riders entering and exiting the flumes.

### 10.6.4 The Coefficient of Friction

The coefficient of friction between the rider and the flume varies with costume types and skin condition.

- Nylon costumes slide well, but baggy cotton shorts can increase friction, slowing the rider down.
- Skin condition has less influence; however, the application of excessive sun-tanning oils or similar preparations can decrease the coefficient of friction, increasing rider speeds.
- Children of small build with cotton tee-shirts and shorts may have difficulty in sliding, whereas a large rider of solid build and wearing copious amounts of tanning oil (and nylon costume) can expect a quick ride.

# SECTION 11 – HYDROTHERAPY POOLS

**APPLICATION**

A pool that is to be constructed/installed for the predominant purpose of physiotherapy/ hydrotherapy shall comply with AS 3979 – 1993, Section 2 Design Requirements and Recommendations; excluding the following clauses listed below, wherein "The Code" Section 2 Design and Construction Requirements shall apply.

- 2.1.7 Lighting.
- 2.2.4.2 Indicators.
- 2.2.6 Concourse drainage and finish.
- 2.2.9 Water circulation.
- 2.3 Electrical equipment.
- 2.4 Pool cleaning equipment.
- 2.5 Pool covers.
- 2.6 Storage areas.

## APPENDIX 1 – APPROVED COLOURS FOR AQUATIC FACILITIES

Aquatic facility water body interior surfaces are required to be finished in materials that are no darker than the following colours, as defined in Australian Standard 2700 – Colour Standards for General Purposes:

**N (Grey or Neutral) Group**

| | |
|---|---|
| N 11 | Pearl Grey |
| N 12 | Pastel Grey |
| N 14 | White |

**G (Green) Group**

| | |
|---|---|
| G 32 | Opaline |
| G 42 | Glacier |
| G 43 | Surf Green |
| G 45 | Chartreuse |
| G47 | Crystal Green |

**B (Blue) Group**

| | |
|---|---|
| B 32 | Powder Blue |
| B 33 | Mist Blue |
| B 35 | Pale Blue |
| B 45 | Sky Blue |

**P (Purple) Group**

| | |
|---|---|
| P 21 | Sunset Pink |
| P 31 | Dusty Pink |
| P 33 | Ribbon Pink |

**X (Yellow - Red) Group**

| | |
|---|---|
| X 31 | Raffia |
| X 32 | Magnolia |
| X 33 | Warm White |
| X 34 | Driftwood |

**Y (Yellow) Group**

| | |
|---|---|
| Y 31 | Lily Green |
| Y 32 | Flummery |
| Y 33 | Pale Primrose |
| Y 34 | Cream |
| Y 35 | Off White |
| Y 45 | Manilla |

**R (Red) Group**

| | |
|---|---|
| R 32 | Apple Blossom |
| R 33 | Ghost Gum |
| R 34 | Mushroom Pink |
| R 41 | Shell Pink |

**T (Blue - Green) Group**

No approved colours in this group

## APPENDIX 2 - RECOMMENDED SAFETY SIGNAGE FOR SPECIAL FACILITIES

It is recommended that safety signage contains the following statements:

### 1. PUBLIC SWIMMING POOLS (GENERAL SAFETY REQUIREMENTS)

- For accidents and emergencies contact – (emergency contact number).
- Children under 10 years of age must be supervised by a competent person 16 years of age, or older, at all times.
- A statement specifying when the swimming pool is open.
- People with communicable/infectious diseases, including gastrointestinal illnesses and skin infections, shall not use the swimming pool.
- Immuno-suppressed individuals should not use the swimming pool.
- Shower before entering the swimming pool.
- No dive-bombing, running or rough play in or around the pool.
- Large objects may obscure vision of the pool. Please remove them when not in use.
- Children should use the toilet before entering the pool.
- Animals not permitted in or around the pool.
- Do not use soap, detergent or any other substance in the pool.
- Do not climb up, or onto any fence or partition of roof within the pool area.
- People wearing contact lenses should remove them before entering the pool.

### 2. SPA POOLS, (TAKEN FROM AS 2610.1; 1993 – PUBLIC SPA POOLS)

- This spa is a heated water environment and if you are concerned that it may adversely affect you, it is your responsibility to seek medical advice.
- Shower before entering the spa.
- Do not put your head under the water.
- Do not swallow spa water.
- Do not use the spa area while under the influence of drugs or alcohol. Certain medications may produce adverse effects.
- Do not use the spa alone.
- Do not use the spa for longer than 15 minutes at a time.
- Do not use the spa if you have an open wound, feel unwell or are pregnant.
- Children shall be supervised in the spa area.

## 3. WATERSLIDES

- Each rider is to immediately leave the waterslide pool on discharge from the flume.
- Tandem riding is only permitted for adults who are accompanying small children on the waterslide.
- No person is to cause, suffer or permit rough behaviour or harassment of other persons in the waterslide pool, on the flume, walkways or platforms.
- Glass bottles, or other articles containing glass and sharp objects are not to be carried or used within the flume, waterslide pool and its surrounds or the walkways.
- Waterslide riders are not to wear any personal effects such as jewellery, watches or spectacles, which are likely to result in personal injury to the rider, other riders, or cause damage to the waterslide.
- Persons are not to use the waterslide in a manner which will cause bodily injury to other slide riders.
- Persons under the influence of alcohol or drugs are not permitted to use the waterslide.
- Do not ride this waterslide unless your physical health is sound.
- Health authorities warn that it is considered unsafe to use a waterslide:

- if you are pregnant;
- if you have a limb or back weakness/disability;
- if you suffer from heart ailments;
- if you have any condition which could predispose you to further aggravation of your pre-existing condition or injury.

- Management reserves the right to refuse entry to any person at all times, ie. where the person is under the influence of alcohol, drugs or for any other reason considered to create a potential hazard for that rider or other persons.

*NON-COMPLIANCE WITH THESE RULES WILL RESULT IN THE RIDER BEING DIRECTED TO LEAVE THE PREMISES.*

# APPENDIX 3 – REQUIREMENTS FOR AQUATIC SOLAR WATER HEATING SYSTEMS

## 1. CONSTRUCTION MATERIALS

Materials used to construct the system shall not contaminate water, or be susceptible to corrosion under normal service conditions.

## 2. TEMPERATURE CONTROL SYSTEM

A temperature control system shall be installed.

The temperature control system shall ensure pool users will not be exposed to water temperatures exceeding $38^0$C.

Thermostats used for this purpose shall be of a type that cannot be adjusted without the use of tools.

## 3. WATER PUMPING SYSTEM

Solar pool heating systems shall be installed on a plumbing circuit that is separate and independent from the filtration system.

A filter or strainer shall be installed to remove solids and/or debris, and shall be located upstream of the pump.

## 4. SUCTION OUTLETS

Suction outlets shall be installed in the wall of the pool at least 500mm above the floor level.

Suction outlets shall be installed in accordance with the provisions of Clause 3.2.6 of this Code.

## 5. DRAINAGE SYSTEM

An automatic or manual drainage system shall be installed, to enable all water to be emptied from the system when not in use.

The drainage system shall incorporate a back-flow prevention valve, to prevent water draining back to the pool through the filter.

# APPENDIX 4 – REQUIREMENTS FOR OZONE WATER TREATMENT SYSTEMS

## 1. GENERAL REQUIREMENTS

Ozone generating equipment shall only be used in conjunction with a free halogen residual, which shall be maintained in the water at all times.

The ozone concentration in the aquatic facility water body shall not exceed 0.1 milligrams per litre.

The operation and maintenance of the ozone generating equipment shall be detailed in the premise's operations manual.

All employees involved in the operation of ozone generating equipment shall be trained in the operation and maintenance of the equipment. Refresher training of ozone equipment operation and maintenance procedures shall be conducted a minimum of once every six months.

## 2. DESIGN REQUIREMENTS

Ozone generating equipment shall incorporate an approved ozone removal system such as granular activated carbon or thermal decomposition – to reduce the concentration of ozone in the water below 0.1 milligrams per litre, prior to it re-entering the water body.

The water shall be monitored with an ORP meter – which has the capacity to shut-off the ozonator if the ORP reading exceeds 900 millivolts.

The ORP system shall have an operational range of 650 millivolts to 900 millivolts.

The ozone generation system shall be provided with an airflow meter and a device to control the airflow.

The ozone injection system shall operate on a vacuum principle, so that a loss of water flow will interrupt the injection of ozone into the water.

A check valve shall be installed between the ozone generator and the injection point.

The ozone injection point shall be located in the return line after the filtration and heating equipment, prior to the disinfectant injection point. The injection point shall be a minimum of 3 metres from the nearest return inlet.

Ozone mixes, diffusers, or contact chambers shall provide efficient mixing of ozone with the recirculation water.

## 3. REQUIREMENTS FOR OZONE PLANT ROOMS

The plant room exit doors shall open outwards.

A ventilation system shall be provided, capable of achieving a minimum of three air changes per hour and have a separate automatic emergency ventilation system, with the capacity to provide a minimum of 30 air changes per hour.

Clearly labelled on/off switches shall be located directly outside the plant room, which indicate and control the following:

- Emergency ventilation systems,
- Lighting,
- Ozone generator.

An audible and visible ozone detection and alarm system shall be located in the room containing the ozone generation equipment that complies with the following requirements:

- The alarm system shall consist of an audible alarm, that is capable of producing at least 85 decibels, and visible alarm consisting of a flashing light, mounted in plain view of the entrance to the ozone equipment room.
- The ozone sensor shall be located at a height of 1.5 metres above floor level and be capable of measuring ozone in the range of 0.0125 parts per million.
- The system shall activate when the ozone concentration reaches 0.1ppm in the plant room.
- Activation of the alarm system shall shut off the ozone generating equipment and turn on the emergency ventilation system.

A sign shall be posted on the exterior of the entry door, stating “DANGER - GASEOUS OXIDISER – OZONE” in lettering not less than 100mm high.

The ozone equipment room shall not be used for storage of chemicals, solvents or any combustible materials, other than those required for the operation of the re-circulation and ozone generating equipment.

# APPENDIX 5 – STAIRWAYS, LADDERS AND PLATFORMS

**REQUIREMENTS FOR DIVING FACILITIES**

## 1. GENERAL REQUIREMENTS

The structure is to be designed and constructed to be easily capable of withstanding maximum loadings.

Surfaces of stairways, ladders and platforms which are likely to become wet shall be self-draining and slip resistive.

Surfaces shall be non-abrasive, and suitable for patrons with bare feet.

Guard-railing or balustrades shall be provided as appropriate, to reduce the possibility of falls.

Access to diving boards and platforms higher than 1.0m shall not be provided by vertical ladders. Access to these facilities shall be provided by stairways.

## 2. REQUIREMENTS FOR STAIRWAYS

Stairways shall have steps with treads at least 280mm wide, and risers not exceeding 180mm in height.

Stairways shall be wide enough to allow easy passage of two riders, with handrails on either side.

Variation between tread dimensions in any flight is not to exceed 5mm.

A tread surface shall be slip resistive.

Surface of every tread shall extend across the full width of stairway.

Gradient of steps shall provide sufficient drainage.

Number of risers shall not exceed 18 in any flight.

A maximum of 36 risers is permitted without a change in direction.

### 2.1 Landings

Length and width of landings shall be no less than the stairways.

Their minimum vertical clearance shall be 2 metres.

Landings shall be provided with adequate drainage.

They shall be provided with guard-railing and balustrades, to prevent falls.

### 2.2 Guard-Railing and Balustrades

Guard-railing and balustrades where provided, shall be to a minimum height of 1.2m.

All guard-railing and balustrades shall be of such design that they will not permit the passage of a 125mm sphere.

Any horizontal or near-horizontal elements between 150mm and 760mm above the floor shall not facilitate climbing.

### 2.3 Handrails

Stairways shall be provided with handrails on both sides.

Handrails shall have a smooth, continuous top surface.

They shall be parallel to the angle of the slope of the stairway or ladder.

They shall extend at least 900mm above the landing, or alternatively, handgrips shall be provided above the level of the opening.

## 3. REQUIREMENTS FOR LADDERS

### 3.1 General Requirements

Ladders shall be not less than 450mm wide.

They shall be provided with metal handrails on both sides.

The handrails shall be at least 30mm in diameter.

### 3.2 Treads

Treads shall have uniform dimensions, such that variations are ± 5mm.

Treads shall be not less than 100mm wide.

They shall be equally spaced, 200 – 250 mm apart.

The top tread shall be level with, and integral with the landing.

Treads shall be slip resistant.

# APPENDIX 6 – SLIP RESISTANCE TESTING AND PERFORMANCE

**AQUATIC FACILITY SURFACES**

Table 11 has been adapted from HB 197 – 1999; *An introductory guide to the slip resistance of pedestrian surface materials*. Column 1 details the range of surfaces that should be modified to maintain a slip resistive surface.

Common surfaces within Aquatic Facilities have been placed into categories as detailed in Column 2, and each Category should then comply with the angle of inclination as detailed in Column 3. The test to determine the surface performance and angle of inclination is the wet barefoot ramp test method from Appendix C AS 4586:2004 – *Slip resistance classification of new pedestrian surface materials.*

**Table 11 – Aquatic Facility Surface - Slip Resistance Performance Guide**

| Column 1<br>**Aquatic Facility Surfaces** | Column 2<br>**Slip Resistance Category** | Column 3<br>**Minimum Mean Angle of Inclination** |
|---|---|---|
| ▪ Passages that are normally maintained in a dry condition, used by barefoot staff or patrons.<br>▪ Individual and communal changing and locker rooms.<br>▪ Water body floors where the water depth is greater than 1.6 metres. | A | 12° |
| ▪ Pool surrounds, concourse and bulkheads.<br>▪ Passages that are normally maintained in a wet condition, used by barefoot staff or patrons.<br>▪ Shower rooms.<br>▪ Waterside shower facilities.<br>▪ Water body floors where the water depth is less than 1.6 metres.<br>▪ Non-swimmer sections of wave-action pools.<br>▪ Lifting platforms.<br>▪ Toddlers' paddling pools.<br>▪ Ladders leading into water bodies.<br>▪ Stairs leading into the water with a maximum width of 1m and handrails on both sides.<br>▪ Ladders and stairs outside the pool area.<br>▪ Seating and resting steps and benches. | B | 18° |
| ▪ Stairs leading into the water, if not classified in Group A or Group B.<br>▪ Starting platform top surfaces.<br>▪ Walk-through wading pools.<br>▪ Sloping pool edges. | C | 24° |

# APPENDIX 7 – WATER BALANCING

Section 5 of this Code recommends that aquatic facility water be correctly balanced.

The concept of water balancing is important, as correctly balanced water will prolong the life of aquatic facility water bodies and their fittings, assist in preventing staining and improve bather comfort.

Unbalanced water can produce a range of problems. These include etching or eroding of water body surfaces and fittings, or alternatively the formation of calcium salt precipitates, also known as scale.

### WATER BALANCE FACTORS

Water balancing ensures that the water in an aquatic facility contains the correct level of dissolved calcium.

The correct level of calcium for a given facility depends upon the level of other materials in the water. Therefore, there is no optimum level of calcium that can be universally applied to all facilities.

The three major factors that affect water balance are calcium hardness, pH and total alkalinity. Temperature also affects the water balance, but to a lesser extent.

The calcium hardness is a measure of the amount of calcium salts present in the water, expressed in milligrams per litre.

The pH is a measure of the relative acid / alkali content of the water. It is measured on a scale from 1 to 14, with 7.0 being neutral. Acid solutions have a pH less than 7.0 whilst alkali solutions have a pH greater than 7.0.

Total Alkalinity is a measure of the amount of alkaline salts present in the water, also expressed in milligrams per litre. These salts act to keep the water slightly alkaline, and reduce pH fluctuations when acids are added to the water.

### THE EFFECT OF CALCIUM SOLUBILITY

Calcium is different to many other materials, as its solubility decreases at higher water temperatures. Calcium solubility also decreases at higher pH and total alkalinity levels.

In general, lower calcium hardness levels are required at higher pH, higher total alkalinity and higher water temperature levels.

### CALCULATING THE WATER BALANCE

The water balance can be calculated using a number of tables or indexes. The following method is known as the Langlier Saturation Index ("SI").

The formula for the Saturation Index is:
SI = pH + TF + AF + CF – 12.1

Where
TF = Temperature Factor AF = Alkalinity Factor CF = Calcium Factor

The above three factors are obtained by reading off the values from Table 12.

**Table 12 – Saturation Index Factors**

| Temp (0C) | TF | Total Alkalinity | AF | Calcium Hardness | CF |
|---|---|---|---|---|---|
| 0 | 0 | 5 | 0.7 | 5 | 0.3 |
| 3 | 0.1 | 25 | 1.4 | 25 | 1.0 |
| 8 | 0.2 | 50 | 1.7 | 50 | 1.3 |
| 12 | 0.3 | 75 | 1.9 | 75 | 1.5 |
| 16 | 0.4 | 100 | 2.0 | 100 | 1.6 |
| 19 | 0.5 | 150 | 2.2 | 150 | 1.8 |
| 24 | 0.6 | 200 | 2.3 | 200 | 1.9 |
| 29 | 0.7 | 300 | 2.5 | 300 | 2.1 |
| 34 | 0.8 | 400 | 2.6 | 400 | 2.3 |
| 41 | 0.9 | 800 | 2.9 | 800 | 2.5 |
| 51 | 1.0 | 1000 | 3.0 | 1000 | 2.6 |

**Example**

Consider a pool with the following water chemistry levels:

pH: 7.7 Temperature: 29 $^0$C
Alkalinity: 100 mg/L Calcium Hardness: 200 mg/L

Using Table 12, the following values would be obtained:

Temperature Factor: 0.7
Alkalinity Factor: 2.0
Calcium Hardness: 1.9

The saturation index is calculated as:

$$SI = pH + TF + AF + CF - 12.1$$

$$= 7.7 + 0.7 + 2.0 + 1.9 - 12.1$$

$$= 0.2$$

**INTERPRETING THE SI VALUE**

The SI value should be maintained between -0.5 and 0.5.

When the SI value is less than -0.5, the water contains insufficient calcium, in relation to the levels of other materials. This may produce corrosion or etching of the facility.

When the SI value is more than 0.5, the water contains excess calcium, in relation to the levels of other materials. This may produce calcium deposits or scaling of the facility.

## ADJUSTING WATER BALANCE VALUES

The water balance may be adjusted by altering any of the four variables in the above equation. However, as the water temperature is often dictated by patron requirements, it is not generally altered to achieve balanced water.

The desired SI value is achieved by adjusting one or more of the pH, alkalinity or calcium hardness values. These parameters may be adjusted using the following methods:

### pH

Adding acids to the water either in dry form (sodium bisulphate) or liquid form (hydrochloric/ sulphuric acid) decreases the pH. These materials also decrease the total alkalinity.

Carbon dioxide gas can also be used to decrease the pH, but is a much weaker acid than the above two materials.

Adding alkalis such as sodium bicarbonate or sodium carbonate increases the pH. Sodium carbonate is a much stronger alkali than sodium bicarbonate, and should be used carefully.

### TOTAL ALKALINITY

The Total Alkalinity is generally increased by adding sodium bicarbonate to the water.
Adding acids (as above), decreases the Total Alkalinity.

### CALCIUM HARDNESS

Calcium hardness is increased by adding calcium chloride to the water. Using calcium-based chlorine disinfectants such as calcium hypochlorite also adds calcium to the water.

The only practical way of lowering calcium hardness is to dilute the material by adding fresh (top-up) water containing a lower level of calcium. Facilities using calcium-based chlorine disinfectants that experience excessive calcium hardness levels can also switch to using non-calcium-based disinfectants.

## APPENDIX 8 – REFERENCES


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## APPENDIX 9 – ACKNOWLEDGEMENTS

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