

**Recommended Standards for Swimming Pool Design and Operation**  
**Policies for the Review and Approval of Plans and Specifications for Public Pools**

**TABLE OF CONTENTS**

	<b>Page</b>
Foreword	
<b>Part 1 - Standards for Swimming Pool Design</b>	<b>12</b>
1.0 Definition and Special Pool Features or Uses	12
1.1 Definition	
1.2 Standard Pool Features or Uses	
2.0 Submission of Plans	12
2.1 General	
2.1.1 Preliminary Plans	
2.1.2 Final Plans	
2.1.3 Approval Required	
2.1.4 Content	
2.2 Basis of Design Report	
2.2.1 Size	
2.2.2 Recirculation	
2.2.3 Use	
2.2.4 Water Supply	
2.2.5 Equipment	
2.2.6 Calculations	
2.2.7 Pump Sizing	
2.2.8 Waste Water Disposal	
2.3 Plans and Specifications	
2.3.1 General Layout Plan	
2.3.1.1 Location and Owner	
2.3.1.2 Scales and Wind Direction	
2.3.1.3 Designer Certification	
2.3.1.4 Plot Plane	
2.3.2 Detailed Plans	
2.3.2.1 Construction Details	
2.3.2.2 Recirculation System	
2.3.2.3 Piping	
2.3.3 Specifications	
2.4 Certification	
3.0 Patron Loading	14
3.1 Designation of Areas	
3.2 Area Loading	
3.2.1 Shallow Area	
3.2.2 Deep Area	
3.2.3 Diving or Slide Area	

	3.2.4 Additional Area Allowance	
4.0	Construction Material	15
	4.1 Materials	
	4.2 Corners	
	4.3 Finish	
5.0	Design, Detail and Structural Stability	15
	5.1 Shape	
	5.2 Shallow End	
	5.3 Bottom Slope	
	5.4 Area Marked	
	5.5 Pool Walls	
	5.5.1 Ledges	
	5.5.2 Pools Without Gutters	
	5.6 Diving Areas	
	5.6.1 Head Room	
	5.6.2 Diving Boards and Platforms	
	5.6.3 Steps and Guard Rails for Diving Boards	
	Table 1	
	5.7 Ladders, Recessed Steps and Stairs	
	5.7.1 Location	
	5.7.2 Ladders	
	5.7.3 Recessed Steps	
	5.7.4 Handrails	
	5.7.5 Stairs and Stair Handrails	
	5.8 Decks	
	5.8.1 Slope	
	5.8.2 Drainage	
	5.8.3 Roll-Out Gutters	
	5.8.4 Carpeting	
	5.8.5 Hose Bibs	
	5.8.6 Spectator Areas	
	5.8.7 Pool Concessions	
	5.9 Fencing	
6.0	Safety, Marking and Sign Requirements	18
	6.1 Depth Markings	
	6.1.1 Location	
	6.1.2 Design	
	6.2 Lifeguard Chairs	
	6.2.1 Number	
	6.2.2 Location and Design	
	6.3 Lifesaving Equipment	
	6.3.1 Unit Composition	
	6.3.1.1 Throwable Device	
	6.3.1.2 Reaching Device	
	6.3.2 Units Required	

	6.3.3 Location	
6.4	First Aid Equipment	
6.5	First Aid Room	
6.6	Emergency Telephone	
6.7	Emergency Exit	
6.8	Signs	
	6.8.1 Location and Maintenance	
	6.8.2 Content	
	6.8.3 Additional Rules	
	6.8.4 Warning Signs	
7.0	Lighting, Electrical, Ventilation and Acoustical Requirements	20
7.1	Lighting	
	7.1.1 Water Surface	
	7.1.2 Underwater	
7.2	Electrical	
7.3	Ventilation	
	7.3.1 Room Ventilation	
7.4	Acoustical Control	
8.0	Water Supply and Wastewater Disposal	21
8.1	Water Supply	
8.2	Cross-Connection Control	
8.3	Sanitary Wastes	
8.4	Pool Waste Water	
8.5	Backflow Prevention	
8.6	Condensate	
8.7	Heat Exchangers	
9.0	Recirculation	21
	9.0.1 Components	
	9.0.2 Recirculation Rate	
9.1	Materials	
9.2	Pipe Sizing	
9.3	Drainage and Installation	
9.4	Pipe and Valve Identification	
9.5	Overflow Systems	
	9.5.1 Gutters (Perimeter Overflow Systems)	
	9.5.1.1 Size and Shape	
	9.5.1.2 Outlets	
	9.5.1.3 Surge Capacity	
	9.5.2 Skimmers	
	9.5.2.1 Construction	
	9.5.2.2 Number	
	9.5.2.3 Location	
	9.5.2.4 Flow Rate	
	9.5.2.5 Control	
	9.5.3 Balancing	

9.6	Main Drain System	
	9.6.1 Design and Location	
	9.6.1.1 Multiple Drains	
	9.6.1.2 Single Drain	
	9.6.1.3 Antivortex Covers	
	9.6.2 Spacing	
	9.6.3 Antivortex Covers on Gratings	
	9.6.4 Piping	
9.7	Pumps and Strainers	
	9.7.1 Strainers	
	9.7.2 Pumping Equipment	
9.8	Flow Measurement and Control	
	9.8.1 Flow Measurement	
	9.8.2 Flow Regulation	
9.9	Inlets	
	9.9.1 Number	
	9.9.2 Location	
	9.9.3 Type	
	9.9.4 Testing	
10.0	Filtration (General)	26
	10.1 Sand Type Filters	
	10.1.1 Filter Rate	
	10.1.2 Filter Media	
	10.1.3 Accessories	
	10.2 Diatomaceous Earth-Type Filters	
	10.2.1 Filter Rate	
	10.2.2 Precoating	
	10.2.3 Body Feed Equipment	
	10.2.4 Regenerative Type Filters	
	10.2.4 Accessories	
	10.3 Cartridge Type Filters	
	10.3.1 Filter Rate	
	10.3.2 Cleaning and Disinfection	
	10.3.3 Accessories	
	10.3.4 Spare Cartridges	
11.0	Disinfection and Chemical Application Equipment	27
	11.1 Chemical Feed Equipment	
	11.1.1 Maintenance	
	11.1.2 Intended Use	
	11.1.3 Safeguards	
	11.2 Disinfection	
	11.2.1 Disinfectant Feeders	
	11.2.2 Capacity	
	11.2.3 Gas Chlorination	
	11.2.3.1 New Installations	
	11.2.3.2 Location	

11.2.3.3	Venting	
11.2.3.4	Lighting	
11.2.3.5	Construction	
11.2.3.6	Chlorine Cylinders	
11.2.3.7	Injection Location	
11.2.3.8	Backflow	
11.2.3.9	Safety Features	
11.2.3.10	Respiratory Protection Device	
11.2.3.11	Leak Detection	
11.2.3.12	Emergency Number	
11.2.3.13	pH Adjustment	
11.2.4	Hypochlorinators	
11.2.4.1	Feed	
11.2.4.2	Solution Tanks	
11.3	Test Equipment	
11.3.1	Equipment Required	
11.3.1.1	Chlorine/Bromine Test Kit	
11.3.1.2	pH Test Kit	
11.3.1.3	Cyanuric Acid Test Kit	
11.3.1.4	Alkalinity and Hardness Test Kit	
12.0	Bathhouse	30
12.1	General	
12.2	Design Criteria	
12.2.1	Bathhouse Routing	
12.2.2	Bathhouse Design	
12.2.3	Fixture Requirements	
12.2.3.1	Showers and Lavatories	
12.2.4	Suits and Towels	
12.2.5	Foot Baths	
12.2.6	Hose Bibs	
12.2.7	Ventilation	
12.2.8	Electrical Receptacles	
13.0	Miscellaneous	32
13.1	Pool Cleaning System	
13.2	Manual	
13.3	Starting Blocks	
13.4	Sand Area Rinse Showers	
13.5	Spray Features	
14.0	Spas	32
14.1	General	
14.2	Physical Separation	
14.3	Patron Load	
14.4	Maximum Depths	
14.5	Stairs, Ladders and Recessed Treads	
14.6	Deck Widths	

14.7	Water Temperature Controls	
14.8	Spa Drainage	
14.9	Entrapment Protection	
14.10	Surface Skimmers	
14.11	Recirculation System Inlets	
14.12	Air Induction Systems	
14.13	Disinfectant Feeders	
14.14	Recirculation Flow Rates	
14.15	Agitation Systems	
14.16	Caution Signs	
15.0	Wading Pools	34
15.1	General	
15.2	Recirculation	
15.2.1	Rate	
15.2.2	Separate System	
15.2.3	Surface Skimming	
15.2.4	Skimmer Equalizer Line	
15.2.5	Inlets	
15.3	Safety	
15.3.1	Barrier and Location	
15.3.2	Fence	
15.3.3	Warning Sign	
15.3.4	Depth Marking	
15.3.5	Steps or Ladders	
16.0	Wave Pools	35
16.1	General	
16.2	Pools	
16.2.1	Depths	
16.2.2	Gutters	
16.2.3	Turnover	
16.3	Decks and Ladders	
16.3.1	Barriers	
16.3.2	Runout	
16.3.3	Access	
16.3.4	Ladders	
16.4	Waves	
16.4.1	Magnitude	
16.4.2	Emergency Shutoff	
16.5	Openings	
16.5.1	Inlet	
16.5.2	Openings to Wave Generating Equipment	
17.0	Zero-Depth Pools	36
17.1	General	
17.2	Lifeguarding Equipment	
17.3	Surface Skimming	

17.4 Runout	
17.5 Recirculation Rate	
17.6 Bottom Inlets	
18.0 Pool Slides	37
18.1 Slides	
18.2 Children's Activity Slides	
18.3 Drop Slides	
18.3.1 Standard Pool Slides	
18.3.2 Entry	
18.3.3 Handrails	
18.3.4 Landing Area	
18.3.5 Landing Area Designation	
18.3.6 Slide Terminus	
18.3.7 Exit Angle	
18.3.8 Water Depth	
18.3.9 Maximum Drop	
18.3.10 Pump Intake	
18.3.11 Safety and Supervision	
18.3.12 Sign	
18.4 Flume Water Slides	
18.4.1 General	
18.4.2 Flumes	
18.4.2.1 Position	
18.4.2.2 Clearances	
18.4.2.3 Elevation	
18.4.2.4 Design	
18.4.3 Plunge Pools	
18.4.3.1 Depths	
18.4.3.2 Plunge Area	
18.4.4 Flume Pumps	
18.4.4.1 Intakes	
18.4.4.2 Check Valves	
18.4.5 Walkways	
18.4.6 Pump Reservoir	
18.4.6.1 Turnover	
18.4.7 Caution Signs	
<b>Part 2 - Standards for Swimming Pool Operation</b>	<b>40</b>
1.0 Water Quality Standards	40
1.1 Disinfection	
1.1.1 Chlorine	
1.1.2 Bromine	
1.1.3 Other Disinfectants	
1.1.4 Cyanuric Acid	
1.1.5 Special Purpose Pools	
1.2 pH and Alkalinity	

	1.2.1 pH	
	1.2.2 Alkalinity	
1.3	Clarity	
1.4	Bacteriological Quality	
	1.4.1 Sample Collection and Analysis	
	1.4.2 Standards	
	1.4.3 Additional Standards	
1.5	Algae Control	
1.6	Superchlorination or Superoxidation	
	1.6.1 Chlorine Residual	
	1.6.2 Pool Use	
	1.6.3 Isocyanurates	
	1.6.4 Other Oxidizers	
1.7	Temperature	
2.0	Routine Operations	42
	2.1 Pool Cleaning	
	2.2 Toilet, Shower and Locker Facilities	
	2.3 Water Analyses	
	2.4 Mechanical System	
	2.5 Recirculation System	
	2.5.1 Overflow Systems	
	2.5.2 Main Drains	
	2.5.3 Inlets	
	2.5.4 Surge Tanks	
	2.6 Water Level	
	2.7 Other Equipment	
	2.8 Records	
	2.9 Chemicals	
	2.10 Annual Facility Evaluation	
3.0	Equipment Maintenance	43
	3.1 Equipment Operation	
	3.1.1 Instructions	
	3.1.2 Continuous Operation	
	3.2 Recirculation Pumps	
	3.3 Filters	
	3.3.1 Sand Filters	
	3.3.1.1 Air Release	
	3.3.1.2 Backwash	
	3.3.1.3 Internal Components	
	3.3.2 Diatomaceous Earth Filters	
	3.3.2.1 Precoat Amount	
	3.3.2.2 Precoat Operation	
	3.3.2.3 Body Feed	
	3.3.2.4 Backwash	
	3.3.2.5 Internal Components	
	3.3.2.6 Extra Supplies	



3.3.3	Cartridge Filters	
3.3.3.1	Cleaning and Replacement	
3.3.3.2	Extra Elements	
3.4	Strainers	45
3.5	Valves	
3.6	Flow Meters	
3.7	Gauges	
3.8	Positive Displacement Feeders	
3.8.1	Inspection	
3.8.2	Intake	
3.8.3	Cleaning	
3.9	Erosion	
3.9.1	Inspection	
3.9.2	Chemicals	
3.9.3	Cleaning	
3.10	Gas Chlorinators	
3.10.1	Servicing	
3.10.2	Gas Leak	
3.11	Pool Structure and Decks	
3.11.1	Cracks	
3.11.2	Painting	
3.12	Electrical Systems	
3.12.1	Electrician	
3.12.2	Lights	
4.0	Patrons, Spectators, and Staff	46
4.1	Patrons	
4.1.1	Disease	
4.1.2	Showers	
4.1.3	Apparel	
4.2	Patron Load Limit	
4.3	Spectators	
4.3.1	Street Clothes	
4.3.2	Food and Drink	
4.4	Staff	
4.4.1	Supervisor	
4.4.2	Lifeguards	
4.4.2.1	Number	
4.4.2.2	Certification	
4.4.2.3	Dress	
4.4.2.4	Attention	
4.4.3	Attendants	
4.4.3.1	Drop Slides	
4.4.3.2	Exemption	
4.4.3.3	Flume Water Slides	
4.4.4	First Aid	
4.4.5	Operator	

5.0	Swimming Pool Closure	48
5.1	Health or Safety Hazards	
	5.1.1 Disinfectant Residual	
	5.1.2 Water Clarity	
	5.1.3 Treatment Equipment	
	5.1.4 Electrical Safety	
	5.1.5 Supervision	
	5.1.6 Other Conditions	
5.2	Closed Pool Security	
5.3	Covers	
	5.3.1 Cleaning	
	5.3.2 Safety Cover	
	5.3.3 Seasonal Closure	
6.0	Safety Equipment	48
6.1	Accident Prevention	
	6.1.1 Decks	
	6.1.2 Deck Equipment	
	6.1.3 Depth Markings	
	6.1.4 Entrances	
	6.1.5 Glass Objects	
	6.1.6 Horseplay	
6.2	Safety Equipment	
	6.2.1 Lifesaving Equipment	
	6.2.2 First Aid Equipment	
	6.2.3 Life Lines	
	6.2.4 Breathing Apparatus	
6.3	Starting Blocks	
6.4	Emergency Plan	

The Great Lakes-Upper Mississippi River Board of Public Health and Environmental Managers (formerly Board of State Sanitary Engineers) created a Standards Committee on Swimming Pools and Bathing Beaches consisting of one associate from each state represented on the Board. The Committee was assigned the responsibility of developing physical, safety, chemical and bacteriological standards for swimming pools.

The standards are intended to serve as a guide for the design of public swimming pools; to encourage submission of plans for proposed public swimming pools or their improvements; and to establish, as far as practicable, uniformity of practice among the several states. Because statutory requirements and legal authority pertaining to public swimming pools are not uniform among the states, and as conditions and administration procedures and policies also differ, the use of these Standards must be adjusted to these variations.

The terms "shall" and "must" are used where practice is sufficiently standardized to permit specific delineation of requirements, or where safeguarding of the public health and safety justifies such definite action. Other terms, such as "should," "recommended," and "preferred," indicate desirable procedures or methods, with deviations subject to individual consideration.

The Committee was also given the charge to develop an operations manual on swimming pools. The Operation Section of the Standards is intended to serve as a guide to the operation of public swimming pools; to supplement the recommended standards of design; and to establish, as far as practicable, uniformity of practice among the several states. The use of these operational standards also must be adjusted for the differing statutory requirements, administrative procedures and policies of the various states.

## PART 1. STANDARDS FOR SWIMMING POOL DESIGN

### 1.0 DEFINITION AND SPECIAL POOL FEATURES OR USES

1.1 DEFINITION - The term "public swimming pool" as used in these standards shall mean any artificial basin of water constructed, installed, modified or improved for the purpose of swimming, wading, diving, recreation or instruction, and includes, but is not limited to, pools serving communities, subdivisions, apartment complexes, condominiums, clubs, camps, schools, institutions, parks, manufactured home parks, hotels, motels, recreational areas and water parks.

These standards are not intended for application to private single-family residence pools which are used strictly for recreational purposes by the occupants and their guests.

1.2 SPECIAL POOL FEATURES OR USES - Standards for unique features of spas, wave pools, zero-depth pools and water slides are provided in separate sections. Any pools used for other special purposes, such as therapy or competition, or those used by physically or mentally handicapped persons, require additional design consideration and should be handled on an individual basis.

Design features that are not specifically covered by these standards shall be permitted only where it is demonstrated that adequate safety and water quality can be maintained, based on current technology and the best information available at the time. Where such design features may affect safety of users, they should be allowed only where continuous direct supervision is provided. Fountains, sprays, or similar features shall be permitted only in water depths not exceeding 2 feet (0.6 m). Such features shall be of a nonclimbable design, unless specifically manufactured and marketed as a climbing structure.

### 2.0 SUBMISSION OF PLANS

#### 2.1 GENERAL

2.1.1 Preliminary Plans - Preliminary plans, specifications, and the architect's or engineer's basis of design report for a public swimming pool should be submitted for review prior to preparation of construction documents.

2.1.2 Final Plans - All basis of design reports and construction documents for formal approval of a public swimming pool shall be submitted at least 30 days prior to the date on which action by the approving authority is desired.

2.1.3 Approval Required - No approval of a public swimming pool for construction shall be issued and no construction begun until final, complete, detailed plans and specifications have been submitted to the reviewing authority and found to be satisfactory.

2.1.4 Content - Plans, specifications and reports submitted for formal approval of a public swimming pool must be an accurate record of the proposed construction and contain sufficient information to demonstrate to the reviewing authority that the proposed public swimming pool, or modifications thereof, will meet the standards contained herein and shall include, at a minimum, the documentation and information listed in 2.2 through 2.4.

## 2.2 BASIS OF DESIGN REPORT

2.2.1 Size - Swimming pool perimeter, area and volume.

2.2.2 Recirculation - Flow rate, turnover and filtration rate.

2.2.3 Use - Anticipated swimmer load (maximum and average).

2.2.4 Water Supply - Source, quality, quantity available and characteristics of the water supply.

2.2.5 Equipment - Detailed description of filtration and recirculation equipment.

2.2.6 Calculations - Hydraulic computations, including head loss in all piping and recirculation equipment.

2.2.7 Pump Sizing - Pump curves showing that the proposed recirculation pump will adequately handle proposed flows.

2.2.8 Waste Water Disposal - Type and capacity of the waste water disposal system.

## 2.3 PLANS AND SPECIFICATIONS

### 2.3.1 General Layout Plan

2.3.1.1 Location and Owner - Name and address of the proposed or modified public swimming pool facility, and the name, address and phone number of the owner.

2.3.1.2 Scale and Wind Direction - Scale, northpoint and direction of prevailing wind.

2.3.1.3 Designer Certification - Name, date, address, phone number, professional seal and signature of the designing engineer or architect.

2.3.1.4 Plot Plan - A plot plan of the property to be used, indicating the topography, grade elevations, arrangement and location of present and proposed structures, location of site utilities and location of the proposed swimming pool, pool enclosure and deck.

2.3.2 Detailed Plans - All detailed plans for a public swimming pool shall be submitted on blue-line or white-line prints and shall be drawn to a suitable scale. The detailed plans for facilities shall show:

2.3.2.1 Construction Details - Complete construction details, including dimensions, elevations and appropriate cross sections for the swimming pool, pool deck and pool enclosure.

2.3.2.2 Recirculation System - Schematic diagrams and plan and elevation views of the pool water treatment and recirculation systems, pool equipment room, and pool and equipment room ventilation.

2.3.2.3 Piping - Size and location of all piping, including elevations.

2.3.3 Specifications - Complete, detailed specifications for the construction of the swimming pool, bathhouse, recirculation system, filtration system, disinfection equipment and all other appurtenances shall accompany the plans.

2.4 CERTIFICATION - After the plans and specifications are approved and the public swimming pool is modified or constructed, the design engineer, architect, or other designated engineer or architect, shall certify to the approving authority that the pool and all appurtenances have been constructed in accordance with approved plans and specifications.

### 3.0 PATRON LOADING

3.1 DESIGNATION OF AREAS - For purposes of computing patron load, those portions of the swimming pool 5 feet (1.5 m) or less in depth shall be designated the "shallow area." Those portions of the swimming pool over 5 feet (1.5 m) in depth shall be designated the "deep area."

#### 3.2 AREA LOADING

3.2.1 Shallow Area - Fifteen square feet (1.4 m<sup>2</sup>) of pool water surface area shall be provided for each patron.

3.2.2 Deep Area - Twenty-five square feet (2.3 m<sup>2</sup>) of pool water surface area shall be provided for each patron.

3.2.3 Diving or Slide Area - Where a separate designated diving or slide area is provided, and other swimmers are not allowed in this area, it may be excluded from the surface area used for computing patron load; however, ten patrons shall be included for each board, platform or slide.

3.2.4 Additional Area Allowance - Additional allowance will be made on the basis of one additional patron per each 50 square feet (4.6 m<sup>2</sup>) of pool deck in excess of the minimum area of deck required, and one additional patron per each 100 square feet (9.3 m<sup>2</sup>) of picnic and play area within the enclosure

#### 4.0 CONSTRUCTION MATERIAL

- 4.1 MATERIALS - Swimming pools shall be constructed of materials which are inert, stable, non-toxic, watertight and enduring. Sand or earth bottoms are not permitted.
- 4.2 CORNERS - All corners formed by intersection of walls and floor shall be rounded with at least a 1-inch (2.5 cm) radius.
- 4.3 FINISH - Bottom and sides must be white or a light color, with a smooth and easily cleanable surface. The finish surface of the bottom in shallow areas (5 feet [1.5 m] or less in depth) shall be slip-resistant.

#### 5.0 DESIGN, DETAIL AND STRUCTURAL STABILITY - All swimming pools shall be designed and constructed to withstand all anticipated loading for both full and empty conditions. A hydrostatic relief valve and/or a suitable underdrain system shall be provided for in-ground pools. The designing architect or engineer shall be responsible for ensuring the stability of the pool design for both full and empty conditions.

- 5.1 SHAPE - The shape of any swimming pool shall be such that the circulation of pool water and control of swimmers' safety are not impaired. There shall be no underwater or overhead projections or obstructions which would endanger patron safety or interfere with proper pool operation.
- 5.2 SHALLOW END - The depth of water at the shallow end shall be at least 3 feet (0.9 m), but not more than 3 feet 6 inches (1.1 m), except for special-purpose pools.
- 5.3 BOTTOM SLOPE - The bottom of the pool shall slope toward the main drain. Where the water depth is less than 5 feet (1.5 m), the bottom slope shall not exceed 1 foot vertical in 12 feet horizontal (1:12). Where the water depth exceeds 5 feet (1.5 m), the bottom slope shall not exceed 1 foot vertical in 3 feet horizontal (1:3).
- 5.4 AREA MARKED - The boundary line between the shallow and deep areas shall be marked by a line of contrasting color at least 4 inches (10 cm) wide on the floor and walls of the pool, and by a safety rope and floats equipped with float keepers. Safety rope anchors should be recessed.
- 5.5 POOL WALLS - Walls of a swimming pool shall be either:
  - a) vertical for water depths of at least 6 feet (1.8 m), or
  - b) vertical for a distance of at least 3 feet (0.9 m) below the water level, below which the wall may be curved to the bottom with a radius not greater than the difference between the depth at that point and 3 feet (0.9 m), provided that the vertical is interpreted to permit slopes not greater than 1 foot horizontally for each 5 feet of depth of sidewall (11 degrees from vertical).
- 5.5.1 Ledges - Ledges shall not extend into the pool unless they are essential for support of the upper wall construction.
- 5.5.2 Pools Without Gutters Bullnosed coping not more than 2 inches (5.1 cm) thick, or other handgrip adjacent to the pool wall shall be provided. The

handgrip shall not be more than 9 inches (23 cm) above the minimum skimmer operating level. When the handgrip is formed by the pool deck, it shall slope away from the pool with a 1-inch drop in a 1-foot distance (1:12).

5.6 DIVING AREAS - The minimum dimensions of the swimming pool and appurtenances in the diving area shall conform to Table 1, page 8. (Note: These diving area dimensions do not meet the requirements of NCAA, U.S. Diving, FINA, NF of SHSA, or AAU. Where competitive diving or competitive-type diving boards are used, compliance with NCAA, U.S. Diving, FINA, NF of SHSA, or AAU requirements is recommended.) Dimensions of pools used only for diving shall be in accordance with the standards of the International Amateur Swimming and Diving Federation (FINA).

5.6.1 Head Room - There shall be a completely unobstructed clear distance of 16 feet (4.9 m) above the diving board measured from the center of the front end of the board. This area shall extend at least 8 feet (2.4 m) behind, 8 feet (2.4 m) to each side, and 16 feet (4.9 m) ahead of the measuring point.

5.6.2 Diving Boards and Platforms - Diving boards and platforms in excess of 3 meters (9.8 ft.) in height are prohibited except where special design considerations and control of use are provided.

5.6.3 Steps and Guard Rails for Diving Boards - Supports, platforms and steps for diving boards shall be designed and constructed to safely carry the maximum anticipated loads. Steps shall be of corrosion-resistant material, easily cleanable and of non-slip design. Handrails shall be provided at all steps and ladders leading to diving boards more than 1 meter (3.3 ft.) above the water. Platforms and diving boards which are more than 1 meter (3.3 ft.) high shall be protected with guard rails at least 36 inches (91 cm) high, extending at least to the edge of the water. Boards or platforms 3 meters (9.8 ft.) or higher, when permitted, shall have an effective side barrier.

## 5.7 LADDERS, RECESSED STEPS AND STAIRS

5.7.1 Location - Recessed steps, ladders, or stairs shall be provided at the shallow end. Ladders or recessed steps shall be provided at the deep end. If the pool is over 30 feet (9.1 m) wide, such steps, ladders, or stairs shall be installed on each side.

5.7.2 Ladders - Pool ladders shall be corrosion-resistant and shall be equipped with slip-resistant treads. All ladders shall be so designed as to provide a handhold. There shall be a clearance of not more than 6 inches (15 cm) nor less than 3 inches (7.6 cm) between any ladder and pool wall. Treads shall be no more than 12 inches (30 cm) apart.



- 5.7.3 Recessed Steps - Recessed steps shall be readily cleanable, slip-resistant, and shall be arranged to drain into the pool. Recessed steps shall have a minimum tread of 5 inches (13 cm) and a minimum width of 14 inches (36 cm). Steps shall be no more than 12 inches (30 cm) apart.
- 5.7.4 Handrails - Where recessed steps or ladders are provided, there shall be a handrail at the top of each side thereof, extending over the coping or edge of the deck.
- 5.7.5 Stairs and Stair Handrails - Where stairs are provided, they shall be located diagonally in a corner of the pool or be recessed. Handrails shall be provided at stairs such that all stair areas are within reach of a handrail. Stairs shall have slip-resistant finish, a minimum tread of 12 inches (30 cm), and a maximum rise of 10 inches (25 cm).
- 5.8 DECKS - An unobstructed deck at least 5 feet (1.5 m) wide shall entirely surround the pool. Infringements or variations are allowed only when specifically permitted by the approving authority. The deck shall be of a uniform, easily cleaned, impervious material with a slip-resistant finish. Wood decks are expressly prohibited within 5 feet (1.5 m) of the pool. The deck shall be protected from surface runoff.
- 5.8.1 Slope - The deck shall be sloped away from the pool, and shall be sloped to provide positive drainage of all deck areas.
- 5.8.2 Drainage - Deck drains, when used, shall be no more than 25 feet (7.6 m) apart, and no single drain shall serve more than 400 square feet (37 m<sup>2</sup>) of area. There shall be no direct connection between the pool deck drains and the sewer or plumbing drainage systems. They shall not drain to the pool gutter or recirculations systems.
- 5.8.3 Roll-Out Gutters - If the pool is equipped with roll-out, deck-level gutters, not more than 5 feet (1.5 m) of deck shall be sloped toward the gutters.
- 5.8.4 Carpeting - Carpeting shall not be permitted on pool decks unless special design considerations are provided and permitted by the approving authority.
- 5.8.5 Hose Bibs - Hose bibs with appropriate backflow preventers shall be provided to facilitate cleaning the deck areas.
- 5.8.6 Spectator Area - There shall be an effective separation between spectator areas and swimmer areas.
- 5.8.7 Pool Concessions - Where concessions are provided, an area or areas separate from the pool deck shall be designated for serving and consuming food or drink.
- 5.9 FENCING - The pool area must be completely surrounded by an effective barrier not less than 4 feet (1.2 m) high. Any special-purpose areas inside the barrier must be fenced or constructed to control traffic. These areas shall be designed so they will not drain onto the deck. Any entrance to the pool area shall be provided

with a self-closing and latching gate/door capable of being locked. Fencing shall have 4-inch maximum openings, and shall be of a not easily climbable design.

## 6.0 SAFETY, MARKING AND SIGN REQUIREMENTS

### 6.1 DEPTH MARKINGS

6.1.1 Location - The depth of water shall be plainly marked at or above the water surface on the vertical pool wall and on the edge of the deck at points of change in bottom slope, and spaced at not more than 25-foot (7.6-m) intervals measured peripherally. Markings shall be on both sides and ends of the pool. Where depth markings cannot be placed on the vertical walls above the water level, other means shall be used so that the markings will be plainly visible to persons in the pool

6.1.2 Design - Markings shall be indicated in feet and inches and may also be indicated in m. The depth markings shall include the units, i.e., "FEET," or "FT.," "INCHES" or "IN.," and "METERS." Depth markings (depths in numerals and units in letters) shall be of 4 inches (10 cm) minimum height and in color contrasting with the background.

### 6.2 LIFEGUARD CHAIRS

6.2.1 Number - A lifeguard chair shall be provided for each 2,000 square feet of water surface area.

Water Surface Area in Square Feet (m <sup>2</sup> )	Minimum Number of Chairs
Less than 2,000 (<186)	0
2,000 to 3,999 (187-372)	1
4,000 to 5,999 (373-557)	2
6,000 to 7,999 (558-743)	3

6.2.2 Location and Design - Lifeguard chairs shall be placed at waterside, in locations which will minimize the effects of glare on the water. Locations shall give complete coverage of the pool . Stands should be 5 to 6 feet (1.5 to 1.8 m) above the deck and should have swivel chairs. Portable chairs shall permit anchoring to the deck.

### 6.3 LIFESAVING EQUIPMENT

6.3.1 Unit Composition One unit of lifesaving equipment shall consist of the following:

6.3.1.1 Throwable Device - A U.S. Coast Guard-approved ring, 18 inches (46 cm) in diameter, or a throwing buoy, fitted with a ¼-inch (6 mm) diameter line with a length of 1.5 times the maximum width of the pool, or 50 feet (15 m), whichever is less.

6.3.1.2 Reaching Device - A life pole or a shepherd's crook-type of pole, with blunted ends and a minimum length of 12 feet (3.7 m).

6.3.2 Units Required - One unit of lifesaving equipment shall be provided for each 2,000 square feet (186 m<sup>2</sup>) of water surface area or major fraction thereof. A minimum of one unit shall be provided.

6.3.3 Location - Lifesaving equipment shall be mounted in conspicuous places, distributed around the swimming pool deck. Whenever lifeguard chairs are provided, each chair shall be equipped with one unit of lifesaving equipment.

6.4 FIRST AID EQUIPMENT - Every swimming pool shall be equipped with a long spineboard with ties and a collar, and with a first aid kit which contains all of the following materials:

two units - 1-inch (2.5 cm) adhesive compress

two units - 2-inch (5.1 cm) bandage compress two units - 3-inch (7.6 cm) bandage compress two units - 4-inch (10 cm) bandage compress

one unit - 3-inch by 3-inch (7.6 cm by 7.6 cm) plain gauze pad

two units - gauze roller bandage

one unit - eye dressing packet

four units - plain absorbent gauze, ½ square yard (0.42 m<sup>2</sup>)

three units - plain absorbent gauze, 24 inches (61 cm) by 72 inches (180 cm)

four units - triangular bandages, 40 inches (101.6 cm/1.0m)

one unit - bandage scissors, tweezers

two units - disposable surgical gloves

one unit - CPR face mask

two units - protective face shield

6.5 FIRST AID ROOM - A swimming pool with a water surface area in excess of 4,000 square feet (370 m<sup>2</sup>) shall have a readily accessible room or area designated and equipped for emergency care. The room or area shall have a cot, sink and telephone.

6.6 EMERGENCY TELEPHONE - Facilities which do not have a first aid room should have a telephone in or immediately adjacent to the pool area. The emergency number shall be posted at each pool area phone.

6.7 EMERGENCY EXIT - An emergency exit from the pool area shall be provided.

6.8 SIGNS

6.8.1 LOCATION AND MAINTENANCE - All pool use rules shall be legibly stated on a sign, and posted in at least one conspicuous location within the pool area. They should also be posted within the bathhouse.

6.8.2 CONTENT - The posted rules shall include:

- Persons with infections not permitted.
- Do not bring food, drink, gum or tobacco or tobacco products into the pool enclosure.
- Shower before entering and after use of toilet facilities.
- No running or rough play.
- No diving, or no diving except in designated diving areas.
- No containers made of glass or shatterable plastic.
- Persons with a disease which can be transmitted through pool use shall not use the pool.

6.8.3 ADDITIONAL RULES - Whenever the regulatory authority determines that additional rules are needed to protect the health and safety of patrons, the management shall post and enforce such rules.

6.8.4 WARNING SIGNS - Whenever the pool area is opened for use and no lifeguard service is provided, warning signs shall be placed in plain view of the entrances and inside the pool area which state, "WARNING - NO LIFEGUARD ON DUTY" with clearly legible letters at least 4 inches (10 cm) high. In addition, the signs shall also state in clearly legible letters at least 2 inches (5.1 cm) high, "NO SWIMMING ALONE. CHILDREN AND NON-SWIMMERS SHALL NOT USE THE POOL UNLESS ACCOMPANIED BY A RESPONSIBLE ADULT."

7.0 LIGHTING, ELECTRICAL, VENTILATION AND ACOUSTICAL REQUIREMENTS

7.1 LIGHTING - Artificial lighting shall be provided at all swimming pools which are to be used at night, or which do not have adequate natural lighting, so that all portions of the pool, including the bottom, may be readily seen without glare. Lights shall be installed so as to provide uniform distribution of illumination.

7.1.1 Water Surface - Overhead illumination on the water surface shall be a minimum of 30 foot-candles (320 lux) when underwater lighting as specified in Section 7.1.2 is provided. Without underwater lighting, a minimum illumination of 50 foot-candles (540 lux) on the water surface shall be provided.

7.1.2 Underwater - When underwater lighting is provided, at least 60 lamp lumens per square foot (930 cm<sup>2</sup>) of pool surface for outdoor swimming pools and 100 lamp lumens per square foot (930 square cm<sup>2</sup>) of pool surface for indoor swimming pools should be provided.

7.2 ELECTRICAL - All electrical installations shall conform to the National Electrical Code of the National Fire Protection Association and the requirements of the appropriate regulatory agency.

7.3 VENTILATION

7.3.1 Room Ventilation - Bathhouses, mechanical equipment rooms, storage areas and indoor swimming pool enclosures shall be heated and ventilated as required by the appropriate regulatory agency. Room ventilation shall prevent direct drafts on swimmers and shall minimize condensation damage. Dehumidifier, air conditioner, and heat exchanger installations shall comply with 8.6 and 8.7. A fuel-burning heating unit shall be provided with air for combustion and vented to the outdoors as required by the regulatory agency.

7.4 ACOUSTICAL CONTROL - Acoustical control shall be provided for indoor pools. Surface material and furnishings used for acoustical control shall be cleanable and constructed of nonabsorbent, water-resistant material.

## 8.0 WATER SUPPLY AND WASTE WATER DISPOSAL

8.1 WATER SUPPLY - Water supplied to a public swimming pool and all related plumbing fixtures, including drinking fountains, lavatories and showers, shall at all times meet the quality standards of the appropriate regulatory agency.

8.2 CROSS-CONNECTION CONTROL - All portions of the water distribution system serving a public swimming pool and related facilities shall be protected against backflow and backsiphonage. Water introduced into the pool, either directly or to the recirculation system, shall be through an air gap or an appropriate approved backflow preventer as required by the appropriate regulatory agency.

8.3 SANITARY WASTES - An approved method for disposing of sanitary sewage shall be provided at a public swimming pool. Where available, a municipal sanitary sewerage system shall be used. If an individual treatment system must be used, approval of the system must be obtained from the appropriate regulatory agency.

8.4 POOL WASTE WATER - Waste water from a public swimming pool shall be discharged in a manner approved by the appropriate regulatory agency.

8.5 BACKFLOW PREVENTION - In a public swimming pool, the recirculation system and pool deck drains shall be protected against the backflow of waste water in a manner approved by the appropriate regulatory agency.

8.6 CONDENSATE - Condensate shall not be introduced to the pool water or any part of the recirculation system.

8.7 HEAT EXCHANGERS - Any heating or cooling system which is connected in any way with the pool recirculation system shall contain only nontoxic heat transfer media, or a double-wall-type heat exchanger with vented intermediate space shall be used.

9.0 RECIRCULATION SYSTEM - Each swimming pool shall be provided with a recirculation system which will convey, clarify, chemically balance and disinfect the swimming pool water. The recirculation system shall include pumps, piping, filters, chemical feed equipment, and associated controls and monitoring devices.

9.0.1 COMPONENTS - Recirculation system components shall comply with

NSF/ANSI Standard 50.

- 9.0.2 RECIRCULATION RATE - A swimming pool recirculation system shall be capable of processing one pool volume of water in six hours or less. A wading pool recirculation system shall be capable of processing one pool volume of water in two hours or less. Spa pools, wave pools and other special purpose pools shall have recirculation systems as required elsewhere in this standard.
- 9.1 MATERIALS - Recirculation system components in contact with the swimming pool water shall be of non-toxic material, resistant to corrosion, and able to withstand operating pressures. Acceptable materials are copper, stainless steel, cast iron, ductile iron, plastics approved for potable water contact by the appropriate regulatory agency, or other materials suitable for potable water contact, subject to approval by the regulatory agency.
- 9.2 PIPE SIZING - Swimming pool recirculation system piping shall be designed so that the water velocity shall not exceed 10 feet (3.0 m) per second on the discharge side of the recirculation pump, and 6 feet (1.8 m) per second in suction piping. Gravity piping shall be sized in accordance with accepted engineering practice with consideration of available head.
- 9.3 DRAINAGE AND INSTALLATION - All equipment and piping shall be designed and fabricated to drain completely by use of drain plugs, drain valves or other means. All piping shall be supported continuously or at sufficiently close intervals to prevent sagging. All suction piping shall be sloped in one direction, preferably toward the pump. All supply and return pipe lines to the pool shall be provided with insertable plugs or valves to allow the piping to be drained to a point below the frost line. Provision shall be made for expansion and contraction of pipes.
- 9.4 PIPE AND VALVE IDENTIFICATION - All exposed piping shall be clearly marked to indicate function. All valves shall be marked to indicate use.
- 9.5 OVERFLOW SYSTEMS - All pools shall be designed to provide continuous skimming (removal of surface water). Makeup water supply equipment shall be provided to maintain continuous skimming.
- 9.5.1 Gutters (Perimeter Overflow Systems) - The gutter shall extend around the full perimeter of the swimming pool except at stairways and ramps entering the swimming pool. It shall be level within a tolerance of plus or minus 1/8 inch (3 mm). Piping connections shall be provided to permit water to flow from overflows to waste, as well as to the recirculation system.
- 9.5.1.1 Size and Shape - The gutter system shall be designed to allow continuous removal of water from the pool's upper surface at a rate of at least 100 percent, and preferably 125 percent, of the recirculation rate. The gutter shall be designed to serve as a handgrip and to prevent entrapment of arms or legs. It shall permit ready inspection, cleaning and repair.
- 9.5.1.2 Outlets - Drop boxes, converters, return piping or flumes used to

convey water from the gutter shall be designed to handle at least 100 percent, but preferably 125 percent, of the recirculation rate. Drainage shall be sufficient to minimize flooding and prevent backflow of skimmed water into the pool

9.5.1.3 Surge Capacity - All overflow systems shall be designed with an effective surge capacity of not less than 1 gallon for each square foot (41 L/m<sup>2</sup>) of pool surface area. Surge shall be provided within a surge tank, in the gutter or filter above the normal flow line, or elsewhere in the system. Surge tanks, gutters and filter tanks should have overflow pipes to convey excess water to waste. Surge tanks shall be provided with means for complete draining. In-pool surge is allowed only with an engineered perimeter gutter system which includes an integral surge weir for each 500 square feet (46 m<sup>2</sup>) of water surface, and a tank to allow balancing of main drain and gutter flows.

9.5.2 Skimmers - The use of skimmers shall be limited to 2,000 or less square feet (186 m<sup>2</sup> or less) of surface area, and should be limited to widths of 30 feet (9.1 m) or less.

9.5.2.1 Construction - Skimmers shall be installed in the pool walls, be sturdy, and be constructed of corrosion-resistant materials. Surface skimmers shall be of a type acceptable to the regulatory agency.

9.5.2.2 Number - At least one surface skimmer shall be provided for each 500 square feet (46 m<sup>2</sup>) of surface or fraction thereof. Additional skimmers may be required to achieve effective skimming. At least two skimmers should be provided.

9.5.2.3 Location - Skimmers shall be so located as to provide effective skimming of the entire water surface with minimum interference and short-circuiting.

9.5.2.4 Flow Rate - Skimmers shall provide for a flow-through rate of 30 gallons per minute (1.9 L/s), or 3.75 gallons per minute per lineal inch (93 mL/s/cm) of weir, whichever is greater.

9.5.2.5 Control - Skimmers shall have weirs that adjust automatically and operate freely and continuously with variations of at least 4 inches (10 cm) in water level. All skimmed water shall pass through an easily removable and cleanable basket or screen before encountering control valves or entering the pump suction line. Each skimmer shall be equipped with a device to control flow. If a skimmer is connected directly to the recirculation pump suction pipe, it should include a device to prevent an airlock in the suction line. If equalizer pipes are used, they shall pass an adequate amount of water to meet pump suction requirements should the water in the pool drop below the weir level. The equalizer pipes

shall be located at least 1 foot (30 cm) below the lowest overflow level of the skimmer. A valve or equivalent device that will remain tightly closed under normal operating conditions, but automatically opens when the water level drops below the minimum operating level of the skimmer, shall be provided on each equalizer pipe.

9.5.3 Balancing - The recirculation system must be balanced to provide for optimum and uniform skimming. Floatation testing should be used for this purpose.

9.6 MAIN DRAIN SYSTEM (Outlet) - Main drains of the pool shall be installed in the pool floor at the deepest point.

9.6.1 Design and Location - The main drain shall be designed to protect against suction entrapment; one or more of the following arrangements shall be used:

9.6.1.1 Multiple Drains - Two or more main drains shall be installed. The drains shall be at least 3 feet (91 cm) apart, shall be connected in parallel, and shall not permit any drain to be individually valved off.

9.6.1.2 Single Drain - A single main drain shall have a total area of at least 144 square inches (930 cm<sup>2</sup>).

9.6.1.3 Antivortex Covers

9.6.2 Spacing - The drains shall not be greater than 20 feet (6.1 m) on centers, and an outlet shall be provided not more than 15 feet (4.6 m) from each side wall.

9.6.3 Antivortex Covers on Gratings - Main drains shall be protected by antivortex covers or gratings. The open area shall be large enough so the velocity does not exceed 1½ feet (46 cm) per second through the grating. Openings in grates shall not be over 1/2-inch (13-mm) wide. Gratings or drain covers shall not be removable without the use of tools.

9.6.4 Piping - The piping shall be designed to carry 100 percent of the recirculation rate, and shall be equipped with a valve.

9.7 PUMPS AND STRAINERS

9.7.1 Strainers - Strainers shall be provided through which all water shall pass before entering the pump. The strainers shall be of rigid construction, fabricated of corrosion resistant material, and sufficiently strong to prevent collapsing when clogged. The openings shall be no greater than 1/8 inch (3 mm) in any dimension. The total clear area of all openings shall be at least four times the area of the connecting pipe. The strainer shall have a quick-opening cover. Spare strainer baskets shall be provided. In systems where the filter is located on the suction side of the pump, strainers are not required.



9.7.2 Pumping Equipment - A pump and motor shall be provided for the recirculation of the swimming pool water. The pump shall provide the recirculation flow rate required in Section 9.0.1, and the filter backwash rate required in Section 10.1.1 against the total dynamic head generated in the recirculation system. The pump shall be self-priming or shall be installed so that there is a net positive suction head on the pump inlet whenever the pump is operating. Multiple pumps should not be provided except for standby purposes. A gauge which indicates both pressure and vacuum shall be installed on the pump suction header, and a pressure gauge shall be installed on the discharge side of the pump. Pumps and motors shall be readily accessible for inspection and service.

## 9.8 FLOW MEASUREMENT AND CONTROL

9.8.1 Flow Measurement - A flow meter or other device which gives a continuous indication of the flow rate in gallons per minute in the recirculation system shall be provided. If sand filters are used, a device should be provided to measure the backwash flow rate in gallons (liters) per minute. Flow meters shall have a measurement capacity of at least 1.5 times the design recirculation flow rate, and shall be accurate within 10 percent of the actual flow rate. The indicator shall have a range of readings appropriate for the anticipated flow rates, and be installed where it is readily accessible for reading and maintenance, and with straight pipe upstream and downstream of any fitting or restriction in accordance with the manufacturer's recommendation.

9.8.2 Flow Regulation - A device for regulating the rate of flow shall be provided in the recirculation pump discharge piping.

9.9 INLETS - The recirculation system shall have inlets adequate in design, number and location to insure effective distribution of treated water and maintenance of uniform disinfectant residual throughout the swimming pool. All other types of inlet systems not covered below shall be subject to approval by the regulatory authority.

9.9.1 Number - Wall inlets shall be spaced not over 20 feet (6.1 m) apart, with one inlet within 5 feet (1.5 m) of each corner of the pool and one in each recessed step area.

9.9.2 Location - Wall inlets shall be located at least 12 inches (30 cm) below the design water surface, or not less than 6 inches (15 cm) if designed to provide downward flow. Bottom inlets shall be uniformly spaced, with a separating distance of no greater than 20 feet (1.5 m), and with rows of inlets within 15 feet (4.6 m) of each side wall. In any pool over 60 feet (18 m) in width, bottom inlets should be provided.

9.9.3 Type Inlet fittings shall be of the adjustable rate-of-flow type. Directional flow inlets shall be used with skimmer-type pools. Inlets shall not extend from the floor or wall to create a hazard.

9.9.4 Testing - Dye testing (crystal violet or equivalent) should be performed to determine and adjust the recirculation pattern.

10.0 FILTRATION (General) - A swimming pool water treatment system shall have one or more filters. Filters shall be of a type approved by the regulatory agency. They shall be installed with adequate clearance and facilities for ready and safe inspection, maintenance, disassembly and repair.

#### 10.1 SAND TYPE FILTERS

10.1.1 Filter Rate - The design filtration rate of rapid sand filters shall not exceed 3 gallons per minute per square foot ( $2.0 \text{ L/s/m}^2$ ) of filter area. High-rate sand filters shall not exceed a filtration rate of 15 gallons per minute per square foot ( $10.2 \text{ L/s/m}^2$ ). Higher rates may be used if the filter has been successfully tested against NSF/ANSI Standard 50 at the higher rate. The sand filter system shall be equipped to backwash each filter at a rate of 15 gallons per minute per square foot ( $10.2 \text{ L/s/m}^2$ ) of filter bed area, or as recommended by the manufacturer. The backwash water shall be discharged to waste through a suitable air gap.

10.1.2 Filter Media - Sand or other media shall be carefully graded and meet the manufacturer's recommendation for pool use.

10.1.3 Accessories - Accessories shall include influent pressure gauge, effluent pressure gauge, backwash sight glass, and air relief valve. The filter system shall have valving and piping to allow isolation, drainage, and backwashing of individual filters, if needed for proper operation.

#### 10.2 DIATOMACEOUS EARTH-TYPE FILTERS

10.2.1 Filter Rate - The design filtration rate for pressure or vacuum filters shall be not greater than 1.5 gallons per minute per square foot ( $1.0 \text{ L/s/m}^2$ ) of effective filter area, except that a maximum filtration rate of 2 gallons per minute per square foot ( $1.4 \text{ L/s/m}^2$ ) may be allowed where continuous "body feed" is provided. Higher rates may be used if the filter has been successfully tested against NSF/ANSI Standard 50 at the higher rate.

10.2.2 Precoating - The filter piping shall be designed to refilter or waste the effluent until a uniform body coat is applied. For pressure-type filters, precoat feed equipment shall be provided to apply not less than 0.1 pound of diatomaceous earth per square foot ( $.49 \text{ kg/m}^2$ ) of filter area.

10.2.3 Body Feed Equipment - Body feed equipment capable of applying not less than 0.1 pound of diatomaceous earth per square foot ( $.49 \text{ kg/m}^2$ ) of filter area per 24 hours should be provided.

10.2.4 Regenerative Type Filters - Regenerative-type filters shall meet the same standards as other pressure filters. Bumping by air or manual means must be provided for, and provision for inspection of elements shall be provided.

10.2.5 Accessories - Accessories for vacuum filters shall include a vacuum

gauge and a vacuum limit switch interconnected with the pump. Pressure filters require a backwash sight glass, effluent pressure gauge, influent pressure gauge and air relief valve. Valving and piping shall be provided to allow isolation, drainage, and backwashing of individual filters, if needed for proper operation.

### 10.3 CARTRIDGE TYPE FILTERS

- 10.3.1 Filter Rate - The design filtration rate for surfacetype cartridge filters shall not exceed .375 gallons per minute per square foot (0.25 L/s/m<sup>2</sup>).
- 10.3.2 Cleaning and Disinfection - Equipment and facilities shall be provided for cleaning and disinfection of filter elements in accordance with manufacturers' recommendations.
- 10.3.3 Accessories - Accessories shall include a pressure gauge or gauges and an air relief valve.
- 10.3.4 Spare Cartridges - An extra set of cartridges, with at least 100 percent filter area, shall be provided.

## 11.0 DISINFECTION AND CHEMICAL APPLICATION EQUIPMENT

- 11.1 CHEMICAL FEED EQUIPMENT - Feeders shall be of sturdy construction and materials which will withstand wear, corrosion or attack by the chemical to be used therein, and which are not adversely affected by repeated, regular adjustments or other normal use conditions. The design shall minimize potential for blockage.
  - 11.1.1 Maintenance - Feeders shall be capable of being easily disassembled for cleaning and maintenance.
  - 11.1.2 Intended Use - The chemical feeder shall be used only for chemicals recommended for use by the feeder manufacturer.
  - 11.1.3 Safeguards - The feeders shall incorporate antisiphon safeguards so that the chemical cannot continue to feed into the swimming pool, the pool piping system, or the swimming pool enclosure if any type of failure of the pool equipment occurs. Chemical feed systems shall be designed to prevent chemical feed when the recirculation pump is off.
- 11.2 DISINFECTION - Swimming pools shall be designed to provide for continuous disinfection of the pool water with a chemical which is an effective disinfectant, and which imparts an easily measured, active residual.
  - 11.2.1 Disinfectant Feeders - An automatic feeder which is easily adjustable shall be provided for the continuous application of disinfectant.
  - 11.2.2 Capacity - Feeders shall be capable of supplying disinfectant at a rate of .1 pound (45 g) chlorine (or equivalent) per gallon per minute recirculation flow. The chemical feed system shall be designed to provide a 24-hour supply of disinfectant at the above rate.

- 11.2.3 Gas Chlorination - The proposed use of gas chlorination should be reviewed with the reviewing authority regarding potential public health hazards, prior to final system design. When compressed chlorine gas is used, the following features shall be provided:
- 11.2.3.1 New Installations - All new installations shall be vacuum-type. All existing pressure-feed-type systems should be converted to vacuum-type.
  - 11.2.3.2 Location - The chlorine room shall be located on the opposite side of the pool from the direction of the prevailing winds. A separate room shall be provided for chlorine and chlorinating equipment. This room shall be at or above grade, and have no opening to other interior spaces.
  - 11.2.3.3 Venting - The chlorine room shall have an airtight duct beginning a maximum of 8 inches (20 cm) above the floor and terminating at a safe point of discharge to the out-of-doors in a direction away from the pool deck. A ventilating fan, capable of one air change per minute and operated from a switch located outside the chlorine room door, shall be provided in conjunction with the airtight duct. A louvered air intake shall be provided near the ceiling.
  - 11.2.3.4 Lighting - Adequate lighting shall be provided inside the chlorine room with the light switch located outside the chlorine room, adjacent to the chlorine room door.
  - 11.2.3.5 Construction - The enclosure, including the door, shall be vandal-resistant. The door of the chlorine room shall not open to the swimming pool, and shall open outward to the out-of-doors. The door shall be provided with a minimum of a 12-inch by 12-inch (30-cm by 30-cm) shatterproof inspection window, and should be provided with "panic hardware" on the inside of the door.
  - 11.2.3.6 Chlorine Cylinders - All full and empty chlorine cylinders shall be anchored. The cylinders in use shall stand on a scale capable of indicating gross weight with 1/2-pound (0.23 kg) accuracy. Storage space shall be provided so that all full and empty chlorine cylinders are not subjected to direct sunlight.
  - 11.2.3.7 Injection Location - The mixing of the chlorine gas and water shall occur in the chlorine room, except where "vacuum type" chlorinators are used.
  - 11.2.3.8 Backflow - The chlorinators shall be designed to prevent the backflow of water or moisture into the chlorine gas cylinder.

- 11.2.3.9 Safety Features - The chlorine feeding device shall be designed to automatically terminate gas feed when the water supply flow is interrupted. The release of chlorine gas shall be terminated when the recirculation pump is shut off.
- 11.2.3.10 Respiratory Protection Device - A respiratory protective device suitable to provide protection during exposure to chlorine gas, or a type approved by the appropriate regulatory agency, shall be provided. This respiratory equipment should meet the selection criteria set forth in the Code Federal Regulations on respiratory protection (29CFR 1910.134). A closed cabinet shall be provided to house the device in a convenient location outside the chlorine room which is quickly and readily accessible.
- 11.2.3.11 Leak Detection - A plastic bottle of ammonia for leak detection shall be provided and automatic chlorine detectors should be provided.
- 11.2.3.12 Emergency Number - The phone number of the fire department or other agency trained in the handling of chlorine leaks must be posted on the outside of the chlorine room door.
- 11.2.3.13 pH Adjustment - Mechanical feed equipment for the purpose of adding a chemical for pH adjustment shall be provided. The capacity shall be consistent with the chlorine feed rate.
- 11.2.4 Hypochlorinators - Where hypochlorinators are used, the following requirements shall apply.
  - 11.2.4.1 Feed - Feed shall be continuous under all conditions of pressure in the recirculation system.
  - 11.2.4.2 Solution Tanks - If calcium hypochlorite is used, two solution tanks, each with minimum capacity of a one-day supply, should be provided.

### 11.3 TEST EQUIPMENT

- 11.3.1 Equipment Required - Test equipment shall be provided to permit testing of all water quality parameters affected by chemical addition.
  - 11.3.1.1 Chlorine/Bromine Test Kit - A DPD (DiethylP-Phenylene Diamine) test kit shall be provided. Where chlorine is used, increments of 0.2, 0.4, 0.6, 0.8, 1.0, 1.5, 2.0, and 3.0 as a minimum, shall be provided to measure the free and combined chlorine residuals. If other halogens are used, an appropriate scale shall be provided. Electronic residual monitoring devices may be used in addition to the test kit.
  - 11.3.1.2 pH Test Kit - A pH test kit with a range from 6.8 to 8.2, accurate to the nearest 0.2 pH unit, shall be provided.

11.3.1.3 Cyanuric Acid Test Kit - Where cyanurates are used, a test kit to measure the cyanuric acid concentration shall be provided. It shall permit readings at least to 100 parts per million (mg/L) with increments of 25 parts per million (mg/L).

11.3.1.4 Alkalinity and Hardness Test Kit - Equipment should be provided to measure alkalinity and calcium hardness. The alkalinity and calcium hardness test range shall be 60 to 400 parts per million (mg/L).

## 12.0 BATHHOUSE

12.1 GENERAL - The term bathhouse shall refer to the dressing, shower, and sanitary facilities which shall be provided adjacent to all swimming pools. Omission of part or all of the pool-side shower and toilet facilities may be approved by the regulatory agency having jurisdiction when adequate facilities are conveniently available as determined by the regulatory authority.

### 12.2 DESIGN CRITERIA

12.2.1 Bathroom Routing - Location of the bathhouse shall be such that the patrons must pass through the bathhouse to enter the pool. The layout of the bathhouse shall be such that the patrons, on leaving the dressing room, pass the toilets, then the showers on route to the swimming pool.

12.2.2 Bathroom Design - Floors of the bathhouse shall be of smooth-finish material with slip-resistant surface, impervious to moisture, easily cleanable and sloped at least 1/4 inch per foot (2 cm/m) to drains. Carpeting shall not be permitted in shower and toilet areas. Junctions between walls and floors shall be coved. Walls and partitions shall be of smooth, impervious materials, free from cracks or open joints. Partitions between dressing cubicles shall terminate at least 10 inches (25 cm) above the floor or shall be placed on continuous raised masonry or concrete bases at least 4 inches (10 cm) high. Lockers shall be set either on solid masonry or concrete bases at least 4 inches (10 cm) high or on legs with bottom of locker at least 10 inches (25 cm) above the floor. Lockers shall be constructed to allow for adequate ventilation.

12.2.3 Fixture Requirements - Unless exempted by Section 12.1, bathhouse facilities shall be provided based on maximum patron load according to the following fixture schedule:

PATRON LOAD	FIXTURES REQUIRED MALE				FIXTURES REQUIRED FEMALE		
	TOILETS	URINALS	LAVATORIES	SHOWERS	TOILETS	LAVATORIES	SHOWERS
0-50	1	1	1	1	1	1	1
51-100	1	1	1	1	2	1	1
101-150	1	2	1	2	3	1	2
151-200	1	2	1	2	3	1	2
201-250	2	2	2	3	4	2	3
251-300	2	3	2	4	5	2	4
301-400	2	3	2	5	5	2	5
401-500	3	3	2	6	6	2	6
501-1000	3	4	2	7	7	2	7
1001-1500	4	5	2	10	9	2	10
1501-2000	5	6	2	15	11	2	15
2001 +	6	7	3	20	13	3	20

\* For swimming pools at schools, camps or similar locations where patron loads may reach peaks due to schedules of use, the fixture schedule should be increased.

12.2.3.1 Showers and Lavatories - Showers shall be supplied with water at a temperature of at least 90 degrees Fahrenheit (32°) and no more than 115 degrees Fahrenheit (46°) and at a rate of at least 1.5 gallons (5.7 L) per minute per shower head. Lavatories should be provided with water at a temperature of at least 90 degrees Fahrenheit (32°) and no more than 115 degrees Fahrenheit (46°). All plumbing shall conform to state and local building codes. Liquid or powdered soap dispensers shall be provided. Glass soap dispensers are not acceptable. Bar soap should not be provided at either showers or lavatories.

12.2.4 Suits and Towels - Where towels and/or swimming suits are furnished, facilities shall be provided for storage of clean and collection of used items.

12.2.5 Foot Baths - The use of foot baths is prohibited.

12.2.6 Hose Bibs - Hose bibs shall be provided and located to enable the entire bathhouse area to be flushed with a 50-foot (15-m) hose. All hose bibs shall be provided with approved back-siphonage devices to protect the water distribution system for the pool and appurtenant facilities at all

times against cross-connection.

12.2.7 Ventilation - Bathhouse facilities shall be provided with mechanical ventilation in accordance with applicable state and local codes.

12.2.8 Electric Receptacles - All bathhouse electrical outlets shall be protected by ground fault circuit interrupters.

### 13.0 MISCELLANEOUS

13.1 POOL CLEANING SYSTEM - A system shall be provided to remove dirt and other foreign material from the bottom of the pool. When a vacuum system is used as an integral part of the recirculation system, connections shall be located in the walls of the swimming pool at least 8 inches (20 cm) below the water line, and at such points that the floor of the pool can be cleaned with no more than 50 feet (15 m) of suction hose. Nothing in this section shall prohibit the use of surface skimmers for vacuum cleaning purposes.

13.2 MANUAL - A manual for operation of the pool shall be provided. Information contained in this manual shall include but not be limited to: instructions for the proper installation, operation, cleaning, winterization and maintenance of all pool equipment; parts list, including drawings and applicable codes; illustrations; charts; operating instructions.

13.3 STARTING BLOCKS - Starting blocks shall be located where the water depth is at least 5 feet (1.5 m). They shall be of a removeable design.

13.4 SAND AREA RINSE SHOWERS - Sand areas shall not be allowed inside of the pool enclosure unless separated by an effective barrier to control access to the swimming pool deck and provided with continuous supervision to enforce the showering requirement. Persons entering the swimming pool area from the sand area shall pass through a water spray or shower which effectively removes sand from the bathers.

13.5 SPRAY FEATURES - Fountains, sprays, or similar features shall be permitted only in water depths not exceeding 2 feet (61 cm) Such features shall be of a nonclimbable design, unless specifically manufactured and marketed as a climbing structure. When pool water is used for spray features, it should be disinfected before use.

14.0 SPAS - A spa is a pool designed for recreational and/or therapeutic use and not drained, cleaned, and refilled for each individual. It may include, but not be limited to, hydrojet circulation, hot water, cold water, mineral baths, air induction systems, or any combination thereof. A pool used under direct supervision of qualified medical personnel is excluded.

14.1 GENERAL - Requirements for conventional swimming pools may be modified or waived for spas at the discretion of the regulatory agency. Except as modified by the following sections, compliance is required with all other applicable sections of these standards.

14.2 PHYSICAL SEPARATION - A spa pool shall be physically separate from any other pool, and there shall be no commingling of water between a spa pool and another pool



- 14.3 PATRON LOAD - The patron load shall not exceed one person per 3 lineal feet (0.9 m) of seat or bench measured at the front edge.
- 14.4 MAXIMUM DEPTHS - The maximum water depth shall be 4 feet (1.2 m) measured from the water line. The maximum depth of any seat or sitting bench shall be 2 feet (0.6 m) measured from the water line.
- 14.5 STAIRS, LADDERS AND RECESSED TREADS - Stairs, ladders, or recessed treads shall be provided when spa depths are greater than 2 feet (0.6 m). A spa shall be equipped with at least one means of egress with handrails for each 50 feet (15 m) of p deck, which may include the coping, shall be provided on two sides or 50 percent or more of the spa. When the spa is adjacent to another pool, the spa shall be located at the shallow end, with a minimum distance of 5 feet (1.5 m) between the pools.
- 14.6 DECK WIDTHS - A 5-foot (1.5 m) minimum width, continuous, unobstructed deck, which may include the coping, shall be provided on two sides or 50 percent or more of the spa. When the spa is adjacent to another pool, the spa shall be located at the shallow end, with a minimum distance of 5 feet (1.5 m) between the pools.
- 14.7 WATER TEMPERATURE CONTROLS - Controls shall be provided to prevent water temperatures in excess of 102 degrees Fahrenheit (39 °C). The controls shall be accessible only to the pool operator.
- 14.8 SPA DRAINAGE - Means to completely drain the spa shall be provided to allow frequent draining and cleaning.
- 14.9 ENTRAPMENT PROTECTION - Outlets shall be designed so that each pumping system prevents patron entrapment. Acceptable means include the use of multiple unvalved outlets, an antivortex drain, and a 12-inch by 12-inch (30-cm by 30-cm) square grate or one of equivalent area.
- 14.10 SURFACE SKIMMERS - One surface skimmer shall be provided for each 100 square feet (9.3 m<sup>2</sup>) or major fraction thereof of surface area.
- 14.11 RECIRCULATION SYSTEM INLETS - A minimum of two inlets shall be provided.
- 14.12 AIR INDUCTION SYSTEMS - An air induction system, when provided, shall prevent water back-up that could cause electrical shock hazards. Air intake sources shall not permit the introduction of toxic fumes or other contaminants.
- 14.13 DISINFECTANT FEEDERS - Gas chlorinators shall not be used.
- 14.14 RECIRCULATION RATE - The recirculation rate shall provide 30 gallons (110 L) per minute per skimmer, or provide a 30-minute turnover, whichever provides a greater flow rate.
- 14.15 AGITATION SYSTEMS - The agitation system shall be separate from the water treatment recirculation system. The agitation system shall be connected to a 10-minute timer located out of reach of a person in the spa.
- 14.16 CAUTION SIGNS - A caution sign shall be mounted adjacent to the entrance

to the spa or hot tub. It should include the following warnings:

## CAUTION

- Pregnant women, elderly persons, and persons suffering from heart disease, diabetes, or high or low blood pressure should not enter the spa/hot tub without prior medical consultation and permission from their doctor.
- Do not use the spa/hot tub while under the influence of alcohol, tranquilizers, or other drugs that cause drowsiness or that raise or lower blood pressure.
- Do not use at water temperatures greater than 102 degrees Fahrenheit (39°).
- Do not use alone.
- Unsupervised use by children is prohibited.
- Enter and exit slowly.
- Observe reasonable time limits (that is, ten to fifteen minutes), then leave the water and cool down before returning for another brief stay.
- Long exposure may result in nausea, dizziness, or fainting.
- Keep all breakable objects out of the area.

A sign should also be posted requiring a shower for each user prior to entering the spa or hot tub and prohibiting oils, body lotion, and minerals in the water.

15.0 WADING POOLS - A wading pool is a pool that is no more than 24 inches (61 cm) deep that is intended for use by young children.

15.1 GENERAL - Wading pools require special consideration in design because of the type of user, the relatively small volume of water, and the shallowness of the water. Except as modified by the following sections, compliance is required with all other applicable parts of these standards.

### 15.2 RECIRCULATION

15.2.1 Rate - The recirculation rate shall provide a turnover of two hours or less. The recirculation rate should provide a one-hour turnover.

15.2.2 Separate System - A wading pool should have a separate recirculation system. If the wading pool shares a recirculation system with another pool, the flow to each pool shall be metered, shall be adjustable, and shall have separate disinfection feed.

15.2.3 Surface Skimming - Intermittent fixed weir overflow structures, including gutters, scuppers, and drains at zero depth may be used. The overflow system shall have a hydraulic capacity of at least 125 percent of the recirculation flow rate. The engineer may be required to demonstrate that the overflow system will provide adequate skimming.

15.2.4 Skimmer Equalizer Line - A skimmer equalizer line may be connected to the main drain.

15.2.5 Inlets - Inlets shall be designed and located to distribute treated water to all parts of the wading pool and to move debris to the overflow and drain systems. The engineer shall be responsible for demonstrating that the inlet system will provide adequate circulation.

### 15.3 SAFETY

15.3.1 Barrier and Location - When a wading pool is in the same enclosure as a supervised swimming pool, there shall be a barrier at least 3 feet (0.9 m) high between the wading pool and the swimming pool. When a wading pool is adjacent to a swimming pool, it shall be near the shallow end of the pool.

15.3.2 Fence - Stand-alone wading pools or wading pools associated with unsupervised swimming pools shall be fenced, as required by Section 5.9

15.3.3 Warning Sign - Whenever a wading pool is open for use, and continuous, direct supervision is not provided by the facility staff, warning signs shall be placed in plain view at the entrance(s) and inside the wading pool area which state, "WARNING: NO LIFEGUARD" in 4-inch (10 cm) letters, and "CHILDREN SHALL BE ACCOMPANIED BY AN ADULT" in letters at least 2 inches (5 cm) high.

15.3.4 Depth Marking - Signs shall be provided at the pool indicating the maximum depth.

15.3.5 Steps or Ladders - Steps or ladders are not required at wading pools.

16.0 WAVE POOLS - A wave pool is a special-use pool with pneumatic wave generating equipment and a design which provides for control of the waves within the side walls and dissipation of the waves at a zero depth shallow end.

16.1 GENERAL - Wave pools require special consultation with the regulatory agency for consideration of design variations and areas where potential problems may exist. Requirements for conventional swimming pools may be modified or waived for wave pools at the discretion of the regulatory agency. Except as modified by the following sections, compliance is required with all other applicable sections of these standards.

### 16.2 POOLS

16.2.1 Depths - The water depth may be reduced to zero at the shallow end to allow for safe access and for dissipation of the waves.

16.2.2 Gutters - Overflow gutters shall be provided, but may be omitted along the side of the pool with the wave generating equipment if effective skimming devices are provided instead. Continuous skimming shall be provided during the quiescent period over the entire length of the gutter. The zero-depth end shall have a continuous trench with a grate.

16.2.3 Recirculation Rate The recirculation rate shall provide a turnover of 4 hours or less. The recirculation rate should provide a 2-hour turnover.

### 16.3 DECKS AND LADDERS

- 16.3.1 Barriers - A safety railing or other effective barrier at least 42 inches (110 cm) in height shall be provided to prevent swimmers from entering the pool at any location other than the zero water depth end. It shall have at least one intermediate-height rail or rope.
- 16.3.2 Runout - Runout areas sloping down toward the zero-depth trench should not exceed 4 feet (1.2 m).
- 16.3.3 Access - Deck areas accessible to swimmers may be omitted along the side of the pool with the wave generating equipment.
- 16.3.4 Ladders - Ladders shall be of a recessed design.
- 16.4.1 Magnitude - The wave generating equipment shall not be capable of producing waves of a magnitude which could cause swimmers to have contact with the pool bottom in the deep end.
- 16.4.2 Emergency Shutoff - An emergency shutoff for the wave generating equipment shall be provided at every lifeguard chair at a minimum. At least four emergency shutoffs shall be provided.

### 16.5 OPENINGS

- 16.5.1 Inlet - The zero-depth area shall have bottom inlets. They shall be located as required by the regulatory agency.
- 16.5.2 Openings to Wave Generating Equipment - Openings to wave generating equipment shall be designed to prevent entrapment of swimmers..

### 17.0 ZERO-DEPTH POOLS

- 17.1 GENERAL - This section applies to zero-depth pools other than wading pools. Except as modified by the following sections, zero-depth pool facilities must comply with all other applicable provisions of these standards.
- 17.2 LIFEGUARDING REQUIREMENT - Zero-depth pools are permitted only where continuous lifeguard service is provided.
- 17.3 SURFACE SKIMMING - A gutter or trench with a grate cover is required along all zero-depth areas. It shall be at an elevation which allows effective skimming at the trench at all times.
- 17.4 RUNOUT - Runout areas sloping toward the zero-depth trench should not exceed 4 feet (1.2 m).
- 17.5 RECIRCULATION RATE - The recirculation rate shall provide a turnover of 2 hours or less for areas of less than 3 feet (0.9 m) of water depth, and a turnover for other areas as specified elsewhere in these standards.
- 17.6 BOTTOM INLETS - A system of bottom inlets must be provided in the shallow end, designed to provide the equivalent of a two-hour turnover for that area.

## 18.0 POOL SLIDES

- 18.1 SLIDES - All slides used at pools shall be specifically designed and intended for use with a pool, and for the specific application. Slides shall be permitted only where supervision will be provided in accordance with section 4.4, on operation.
- 18.2 CHILDREN'S ACTIVITY SLIDES - Children's activity slides are small slides with a low exit velocity designed by the manufacturer for use by small children at pools. They must be designated by the manufacturer for use in 24 inches (61 cm) or less of water, and installed accordingly.
- 18.3 DROP SLIDES - A drop slide is a slide which discharges to a pool with a drop of more than 2 inches (5 cm) to the water surface.
- 18.3.1 Standard Pool Slides - Standard pool slides for use at swimming pools shall conform to Part 1207 of the Consumer Product Safety Act [Sec. 7(f), Public Law 92-573, 86 Statute 1215, 15 U.S.C. 1056(f)].
- 18.3.2 Entry - Slide entry areas shall be designed so the rider is able to properly enter and position him or herself before sliding down the chute. This area shall be a small platform or a less-sloped portion of chute, with well-placed assist bars.
- 18.3.3 Handrails - Drop slides shall have handrails on both sides of the ladder or steps. Platforms and landings shall have 42-inch-high (110-cm) guardrails, with at least one intermediate-height rail.
- 18.3.4 Landing Area - There shall be a drop slide landing area extending 5 feet (1.5 m) on either side of the center line of the slide and from the back wall to 20 feet (6.1 m) in front of the slide terminus. This area shall not infringe on the required landing areas for other drop slides, water slides, or diving equipment.
- 18.3.5 Landing Area Designation - The drop slide landing area shall be separated from the rest of the pool in a manner approved by the regulatory authority. A slide mounted in a separate diving area may be allowed to use the diving area separation as long as access to the diving well is restricted to patrons using the slide and diving equipment.
- 18.3.6 Slide Terminus - The terminus of the chute shall extend beyond the pool wall, and be so oriented that the safety area in front of the slide does not interfere with the safety area of another slide or other pool equipment.
- 18.3.7 Exit Angle - The maximum angle of the slide runway at the exit shall be between zero degrees and 11 degrees, measured downward from horizontal

18.3.8 Water Depth - The area from the slide terminus outward to 6 feet (1.8 m) in front of the slide terminus shall have a depth as established from the table below. The slide shall be constructed so the rider enters the water in this 6-foot (1.8-m) area. If the depth is 5 feet (1.5 m) or less, the bottom in this area shall have a maximum slope of 1 inch in 12 inches (1:12), and the slide shall be located at least 5 feet (1.5 m) from any change to steeper slope of the pool bottom.

Water Depth from the Slide Terminus to 6 Feet (1.8 m) in Front of the Terminus (see above)	Corresponding Maximum Exit Height Above the Water
4 to 5 feet (1.2 to 1.5 m)	12 inches (30 cm)
8-feet (2.4-m) minimum	42 inches (110 cm)

18.3.9 Maximum Drop - The maximum drop height at the terminus of the slide shall not exceed 42 inches (110 cm).

18.3.10 Pump Intake - If water is pumped from a swimming pool to the slide, the pump intake shall be enclosed or constructed in a manner to prevent injury or entrapment of swimmers. Intake velocity shall not exceed 1 1/2 feet (46 cm) per second.

18.3.11 Safety and Supervision - Slides shall be located and constructed to allow easy supervision. When a slide is not supervised, or not open for use, it shall be secured to prevent access.

18.3.12 Sign - The slide shall have posted a set of rules that include the following:

- One rider at a time. Wait until the landing area is clear before entering the slide.
- Slide in a sitting position or on the back only.
- Do not attempt to stop in the slide.
- Leave plunge area immediately.
- Non-swimmers not permitted. (If over 5 feet [1.5 m] deep.)

18.4 FLUME WATER SLIDES - A flume water slide consists of one or more flumes entering a plunge pool or dedicated plunge area of a multiple use pool at or near the water level.

18.4.1 General - Water slides require special consultation with the regulatory agency for consideration or design variations and areas where potential problems may exist. Requirements for conventional swimming pools may be modified or waived for water slides at the discretion of the regulatory agency. Except as modified by the following sections, compliance is required with all other applicable sections of these standards.

#### 18.4.2 Flumes

- 18.4.2.1 Position - A flume shall be perpendicular to the plunge pool wall for a distance of at least 10 feet (3 m) from the exit end of the flume.
- 18.4.2.2 Clearances - The distance between the side of a flume terminus and a plunge pool side wall shall be at least 4 feet (1.2 m). The distance between sides of adjacent flume terminuses shall be at least 6 feet (1.8 m) The distance between a flume exit end and the opposite side of the plunge pool, excluding steps, shall be at least 20 feet (6.1 m).
- 18.4.2.3 Elevation - A flume shall terminate at a depth between 6 inches (15 cm) below the plunge pool operating water surface level and 2 inches (5 cm) above the water surface level. The flume shall not exceed a one-in-ten slope for a distance of at least 10 feet (3.0 m) from its exit end.
- 18.4.2.4 Design - The design of the flume shall minimize abrupt contact with the slide and prevent people from being airborne.

#### 18.4.3 Plunge Pools

- 18.4.3.1 Depths - The plunge pool operating water depth at the end of a flume shall be 3 to 4 feet (0.9 to 1.2 m). A depth of at least 3 feet (0.9 m) shall be maintained in front of the flume for a distance of at least 10 feet (3.0 m), from which the pool floor may have a constant slope upward.
- 18.4.3.2 Plunge Area - The plunge area in multi-use pools shall be designated by float ropes, and each area shall have ladders, steps, or stairs for egress.

#### 18.4.4 Flume Pumps

- 18.4.4.1 Intakes - The flume pump intake(s) shall be designed to prevent patron entrapment. The water velocity through the intake(s) cover(s) shall be no greater than 1½ feet (46 cm) per second. The intake cover(s) shall be designed to be easily cleaned.
- 18.4.4.2 Check Valves - Each flume pump discharge pipe shall have a check valve.

18.4.5 Walkways - A 4-foot (1.2-m) minimum width, surfaced walkway or steps shall be provided between the plunge pool deck and the steps leading to the top of the flume(s).

18.4.6 Pump Reservoir - If a separate pump reservoir is provided, it shall have a main drain and surface skimmer, both connected to the recirculation system.

- 18.4.6.1 Recirculation Rate - The recirculation rate for a dedicated plunge pool shall provide a turnover of 1 hour or less. Multiple use



pools with water slides should have an increased recirculation rate and chemical treatment capability.

18.4.7 Caution Signs - A legible sign shall be posted at the top of the flume(s). The sign shall state:

**CAUTION**

- Do not use this slide while under the influence of alcohol or drugs.
- Only one person allowed at a time.
- Follow the instructions of the attendant and/or lifeguard.
- No running, standing, kneeling, rotating, tumbling or stopping in the flumes or tunnels.
- Keep your hands inside the flume.
- No diving from a flume.
- Leave the plunge pool promptly after entering it.

**Part 2 – Standards for Swimming Pool Operation**

**1.0 WATER QUALITY STANDARDS**

1.1 DISINFECTION - Swimming pool water shall be automatically and continuously disinfected. All disinfecting materials and methods shall:

- a. be used only with the approval of the regulatory agency;
- b. not create an undue safety hazard when handled, stored, and used according to label directions;
- c. be compatible for use with other chemicals normally used in pool water treatment, or be clearly identified as having a use limitation;
- d. not impart toxic properties to the water when used according to direction, and
- e. provide an effective residual which can be easily and accurately measured by a field test procedure.

1.1.1 Chlorine - When chlorine is the disinfectant, a free chlorine residual of at least .5 mg/l for a pH of 7.2 shall be maintained throughout the pool. For higher pH values, higher free chlorine residuals of at least 0.2 mg/l for each 0.2 pH unit increase shall be maintained.

1.1.2 Bromine - When bromine is the disinfectant, a residual of at least 1.0 mg/l shall be maintained throughout the pool for pH below 7.8, and 2.0 mg/l for a pH of 7.8 or higher.

1.1.3 Other Disinfectants - Another disinfecting material or method may be used when it has been demonstrated to provide a satisfactory residual which is easily measured and is as effective under conditions of use as the

chlorine concentrations required herein.

1.1.4 Cyanuric Acid - When a chlorinated isocyanurate is used as the disinfectant, a free chlorine residual of at least 1.0 mg/L for a pH of 7.2 shall be maintained throughout the pool. For higher pH values, higher free chlorine residuals of at least 0.4 mg/L for each 0.2 pH unit increase shall be maintained. The cyanuric acid concentration in the pool water shall not exceed 100 mg/L.

1.1.5 Special Purpose Pools - The regulatory agency may require a higher disinfectant residual than stated in 1.1.1, 1.1.2, and 1.1.4 for slide pools, spas, or other special-purpose pools.

## 1.2 pH AND ALKALINITY

1.2.1 The swimming pool water pH shall be maintained at a level between 7.2 and 8.0.

1.2.2 Alkalinity - The alkalinity of the water should be maintained at a level between 70 and 150 mg/L as calcium carbonate.

1.3 CLARITY - The water shall have sufficient clarity that a black and white disc, 3 to 6 inches (7.6 to 15 cm) in diameter, is readily visible when placed at the deepest point of the swimming pool and viewed from the side of the swimming pool.

## 1.4 BACTERIOLOGICAL QUALITY

1.4.1 Sample Collection and Analysis - Water samples for bacteriological examination shall be collected while the swimming pool is in use. The residual disinfectant in the sample shall be deactivated, and the samples shall be examined in accordance with procedures acceptable to the regulatory agency. The latest edition of Standard Methods for the Examination of Water and Wastewater should be used (APHA, AWWA and WPCF)

1.4.2 Standards - A water sample shall not contain more than 200 colonies per 1 milliliter of water, as determined by the Standard Plate Count, or show a positive test (confirmed test) for coliform organisms. When the bacteriological standard is exceeded, the pool shall be superchlorinated and immediately retested. The cause of the unsatisfactory sample(s) shall be investigated and corrective action initiated if appropriate.

1.4.3 Additional Standards - In addition to the standards in 1.4.2, the regulatory agency may use the following for a more complete analysis of pool water quality:

- a. The heterotrophic plate count (HPC) shall not exceed 100 colonies per 1 milliliter of water.
- b. The standard procedure for the isolation of staphylococcus aureus organisms shall indicate not more than 50 organisms per 100 milliliters of water.

- 1.5 ALGAE CONTROL - An algicide may be used provided it complies with Section 1.1, a. through d. and is used in accordance with the directions on the label.
- 1.6 SUPERCHLORINATION OR SUPEROXIDATION - If the concentration of combined residual chlorine is greater than 0.2 mg/l, the swimming pool water should be superchlorinated to reduce the concentration of combined residual chlorine.
  - 1.6.1 Chlorine Residual - During superchlorination, the free chlorine residual should be raised to a level of at least ten times the combined chlorine level present.
  - 1.6.2 Pool Use - Swimmers shall not be allowed in the swimming pool during superchlorination. They may be allowed in the pool when the free chlorine residual is less than 5 mg/L.
  - 1.6.3 Isocyanurates - Isocyanurates shall not be used for superchlorination.
  - 1.6.4 Other Oxidizers - Persulfate compounds may be used for superoxidation if used according to manufacturer's instructions.
- 1.7 TEMPERATURE - The pool water temperature should be maintained between 72 degrees Fahrenheit (22°C) and 85 degrees Fahrenheit (29°C), except for special purpose therapy pools or spa pools. The air temperature for an indoor swimming pool should be maintained from 2 degrees Fahrenheit (1°C) to 5 degrees Fahrenheit (3 C) above the pool water temperature.

## 2.0 ROUTINE OPERATIONS

- 2.1 POOL CLEANING -The swimming pool and deck areas shall be cleaned, the pool water surface skimmed, and the pool walls and bottom vacuumed or brushed, all on a daily basis during off-use hours.
- 2.2 TOILET, SHOWER AND LOCKER FACILITIES - The facilities, including the floors, showers, and toilet facilities, shall be cleaned and disinfected daily. Public lockers shall be inspected and be cleaned as necessary. All fixtures and equipment shall be maintained in an operable condition. Liquid soap dispensers shall be filled daily.
- 2.3 WATER ANALYSES - Water quality analyses shall be performed at a frequency and at such locations as established by the regulatory agency. Test kits shall be properly maintained. Reagents shall be renewed semi-annually for indoor pools and prior to annual opening for seasonal use pools.
- 2.4 MECHANICAL SYSTEM - All items of mechanical equipment and all parts of the mechanical system shall be inspected daily. Necessary repairs to assure proper operation shall be made.
- 2.5 RECIRCULATION SYSTEM - The recirculation system shall be inspected daily, and maintained in proper operation.
  - 2.5.1 Overflow Systems - Surface skimmers and perimeter overflow systems shall be cleaned daily and shall be adjusted as necessary to assure effective skimming.

- 2.5.2 Main Drains - Broken main drain grates shall be repaired or replaced as soon as possible. If the main drain grate is missing, the pool shall be closed until an approved main drain grate is properly installed.
- 2.5.3 Inlets - Inlet flow rates and directions shall be checked and shall be adjusted as necessary to assure circulation in all areas of the pool.
- 2.5.4 Surge Tanks - Surge tank controls shall be adjusted as necessary to maintain the water level in the proper operating range. Surge tanks shall be drained and cleaned at least annually.
- 2.6 WATER LEVEL - Water shall be added as needed to keep the pool water at a level needed to assure effective skimming.
- 2.7 OTHER EQUIPMENT - All safety equipment, deck equipment, and signs shall be checked daily to assure compliance with the appropriate sections of these standards.
- 2.8 RECORDS - Daily operating records shall be maintained by the owner or operator on forms acceptable to the regulatory agency. They shall be submitted to the regulatory agency when requested. The records should contain such information as disinfectant residual, pH, results of any other chemistry and bacterial imbalances, water temperature, amount of chemicals used, flow rate, filter backwashing, equipment breakdowns, amount of makeup water, number of patrons, respiratory protection device usage, drownings or other personal accidents, and unusual problems or occurrences. Daily operating records shall be retained, and shall be available for on-site inspection, for at least six months, or longer if required by the regulatory agency. Unusual problems or occurrences should also be reported immediately to the regulatory agency.
- 2.9 CHEMICALS - All chemicals shall be handled in accordance with the manufacturers' recommendations. Chemical containers shall be labeled with chemical name and appropriate hazard designation. Material safety data sheets shall be available on site for all chemicals used.
- 2.10 ANNUAL FACILITY EVALUATION - A total facility evaluation should be scheduled and conducted at least annually, and the pool closed as necessary for repairs and maintenance.

### 3.0 EQUIPMENT MAINTENANCE

#### 3.1 EQUIPMENT OPERATION

- 3.1.1 Instructions - All equipment shall be operated and maintained in accordance with the manufacturers' instructions. A manual of operation provided by the consultant, and manufacturers' instructions for operation and maintenance of the equipment, shall be maintained and kept available. When such instructions are not available, the regulatory agency should be contacted for advice and consultation.
- 3.1.2 Continuous Operation - Pumps, filters, disinfectant feeders, flow indicators, gauges, and all related components of the pool water recirculation system shall be kept in continuous operation, 24 hours a day.

3.2 RECIRCULATION PUMPS - The pump and motor shall be checked at regular intervals. The pump shall not be throttled on the suction side during normal operation.

3.3 FILTERS

3.3.1 Sand Filters

3.3.1.1 Air Release - The filter air release valve shall be opened daily, or more frequently if necessary, to remove air which collects in the filter.

3.3.1.2 Backwash - Filters shall be backwashed at a proper flow rate in accordance with the manufacturer's recommendations. Filters should be backwashed before the pressure differential exceeds 8 pounds per square inch (SSkPa), or whatever pressure differential is recommended by the manufacturer, or if the flow rate drops below the minimum required flow rate.

3.3.1.3 Internal Components - Inspection of the internal components of pressure filters shall be conducted annually, or at any time the filters fail to produce clear effluent. Deficiencies shall be corrected.

3.3.2 Diatomaceous Earth Filters

3.3.2.1 Precoat Amount - The amount of diatomaceous earth precoat shall be at least 0.1 pound per square foot (.49 kg/m<sup>2</sup>) of element surface area, and should be at least .15 pounds per square foot (.73 kg/m<sup>2</sup>).

3.3.2.2 Precoat Operation - During precoating, the filter effluent shall be recirculated through the filter until the effluent is clear, or the initial filter effluent shall be discharged to waste until clear water is produced.

3.3.2.3 Body Feed - When continuous body feed is used, it should be applied at a rate of 0.5 to 1.5 ounces per square foot (.15 to .46 kg/rn ) of surface area per day, or as needed to extend filter cycles.

3.3.2.4 Backwash - Pressure filters shall be backwashed when the pressure differential between the filter influent and effluent lines reaches the manufacturer's recommended maximum pressure differential, or when the rate of flow drops below the minimum required flow rate whichever occurs earlier. When the recirculation pump stops or is shut off, the filter shall be backwashed. The elements shall be precoated before placing the pump back into operation. Vacuum filters shall be washed when the pump suction gauge reaches the manufacturer's recommended maximum vacuum, or the flow rate drops below the minimum

required flow rate, whichever occurs first.

3.3.2.5 Internal Components - A pressure filter shall be opened for inspection at least once a year, and whenever it fails to produce a clear effluent. Deficiencies shall be corrected.

3.3.2.6 Extra Supplies - An extra supply of septa and at least two weeks' supply of diatomaceous earth should be available.

### 3.3.3 Cartridge Filters

3.3.3.1 Cleaning and Replacement - Cartridge filter elements shall be cleaned, disinfected, and replaced as recommended by the manufacturer of the filter.

3.3.3.2 Extra Elements - At least one extra set of filter elements shall be available.

3.4 STRAINERS - Strainer baskets shall be removed and replaced by clean basket~ frequently. The pump shall be stopped before a strainer is opened. In the case of a diatomaceous earth filter, the dirty strainer basket should be replaced with a clean one when the filter is backwashed.

3.5 VALVES - Valves shall be operated through their entire operation range occasionally to prevent corrosion and dirt from sealing them. Valve stem packing glands shall be tightened or repacked as necessary to prevent leakage.

3.6 FLOW METERS - Flow meters shall be maintained in an accurate operating condition. The glass and the connecting tubes shall be kept clean.

3.7 GAUGES - The lines leading to gauges shall be bled occasionally to prevent blockage. Gauges shall be inspected periodically to assure proper operation, and shall be maintained in operating condition.

### 3.8 POSITIVE DISPLACEMENT FEEDERS

3.8.1 Inspection - Positive displacement feeders shall be periodically inspected and serviced.

3.8.2 Intake - The suction intake should be suspended at least 6 inches (15 cm) above any sludge layer in the solution tank.

3.8.3 Cleaning - Feeder, tubing, and valves shall be periodically cleaned or replaced in accordance with manufacturers' recommendations.

### 3.9 EROSION FEEDERS

3.9.1 Inspection - Erosion feeders shall be periodically inspected and serviced.

3.9.2 Chemicals - Only chemicals recommended by the feeder manufacturer shall be used in the feeder.

3.9.3 Cleaning - Connecting tubes shall be periodically cleaned or replaced to permit continuous free circulation.

### 3.10 GAS CHLORINATORS

- 3.10.1 Servicing - Gas chlorinators shall be serviced or repaired only by trained qualified personnel.
- 3.10.2 Gas Leak - In the event of a chlorine gas leak, evacuation procedures established in the emergency plan must be followed, and the fire department or an agency trained in handling chlorine leaks must be immediately contacted.

### 3.11 POOL STRUCTURE AND DECKS

- 3.11.1 Cracks - Cracks in the pool walls, floors, perimeter overflow systems and decks shall be repaired as soon as possible. Seasonal-use pools shall have all repairs completed prior to annual reopening.
- 3.11.2 Painting - The pool walls, floor, and deck equipment shall be painted as often as necessary to keep them in good condition and free of corrosion. Paint for the pool structure shall be white or a light color. Steps, or at least the front edge of the step treads which lead into a pool should be painted to contrast with the rest of the pool

### 3.12 ELECTRICAL SYSTEMS

- 3.12.1 Electrician - Periodic inspections should be made by a licensed or certified electrician. Repairs to any electrical system shall be made only by a licensed or certified electrician.
- 3.12.2 Lights - Defective underwater and overhead lights, including their lenses, shall be immediately repaired or replaced.

## 4.0 PATRONS, SPECTATORS, AND STAFF

### 4.1 PATRONS

- 4.1.1 Disease - A person having an infectious or communicable disease shall not be permitted in a swimming pool.
- 4.1.2 Showers - A person using a swimming pool shall shower before entering the pool enclosure. A person leaving the pool to use a toilet shall shower before returning to the pool
- 4.1.3 Apparel - Only clean swimwear shall be worn in a swimming pool.

4.2 PATRON LOAD LIMIT - The number of patrons within the swimming pool enclosure shall not exceed the approved design capacity. Be sure posting is required.

### 4.3 SPECTATORS

- 4.3.1 Street Clothes - A person in street clothes or shoes shall not be permitted on the swimming pool deck or in the pool
- 4.3.2 Food and Drink - No food, drink, gum, tobacco, or glass shall be permitted at the pool deck area.

#### 4.4 STAFF

4.4.1 Supervisor - Every pool shall be under the supervision of a responsible supervisor or lifeguard. This person shall require careful observance of sanitary and safety regulations.

#### 4.4.2 Lifeguards

4.4.2.1 Number - The number of lifeguards shall be determined based on anticipated usage and design characteristics. The regulatory agency should be consulted.

4.4.2.2 Certification - Each lifeguard shall have a valid and current lifesaving or lifeguarding certificate from the American National Red Cross, National Y.M.C.A., or equivalent, as determined by the regulatory agency.

4.4.2.3 Dress - Each lifeguard on duty shall be appropriately dressed and identifiable.

4.4.2.4 Attention - A lifeguard on duty shall not engage in activities which would distract his or her attention from the lifeguard duties.

#### 4.4.3 Attendants

4.4.3.1 Drop Slides - Attendants shall be stationed at a point where they can control patrons entering the slide. An attendant may supervise no more than two drop slides. Slides shall be located and constructed to allow easy supervision.

4.4.3.2 Exemption - Slides meeting the construction criteria specified in sections 18.2 or 18.3 may be exempt from the lifeguard and attendant requirement if they meet all of the criteria below.

- 1) They are 6 feet or less in height from slide entrance to slide exit.
- 2) The discharge is 6 inches or less above the water surface.
- 3) The user has a clear view of the landing area from all locations on the slide.
- 4) The slide cannot be a tube or be covered to restrict the view of the landing area.

4.4.3.3 Flume Water Slides - All flume water slides must be directly supervised, with attendants at top and bottom areas.

4.4.4 First Aid - A person trained in first aid shall be available on the premises whenever the swimming pool or spa is open for use. A person trained in cardiopulmonary resuscitation (CPR) shall also be available.

4.4.5 Operator - A person knowledgeable in poolside testing of the water and in operating the water treatment equipment shall be available whenever the pool is open for use.



## 5.0 SWIMMING POOL CLOSURE

- 5.1 HEALTH OR SAFETY HAZARDS - Any of the following conditions shall constitute sufficient grounds to order a swimming pool closed:
- 5.1.1 Disinfectant Residual - Failure to comply with the disinfectant residual levels established in Section 1.1.
  - 5.1.2 Water Clarity - Failure to comply with the water clarity requirement established in Section 1.3.
  - 5.1.3 Treatment Equipment - Inoperable pump, filter, or disinfectant feeder.
  - 5.1.4 Electrical Safety - Presence of bare electrical wires or other obvious electrical deficiency.
  - 5.1.5 Supervision - Absence of supervisor or required lifeguard.
  - 5.1.6 Other Conditions - Existence of any condition creating an immediate danger to the health or safety of the pool patrons or its personnel
- 5.2 ALL TIMES WHEN THE POOL IS CLOSED FOR ANY REASON ALL ENTRY/EXIT POINTS SHALL BE PROPERLY MAINTAINED AND SECURED AGAINST UNAUTHORIZED ENTRY, AND A SIGN SAYING "DANGER - POOL CLOSED" SHALL BE PROVIDED.
- 5.3 COVERS
- 5.3.1 Cleaning - Pool covers must be maintained in a clean and sanitary condition to preclude contamination of the pool water.
  - 5.3.2 Safety Cover - If the deck area is accessible when the pool is covered, a fully secured safety cover should be used.
  - 5.3.3 Seasonal Closure - It is recommended that an outdoor pool which is closed for the season, but allowed to retain water, be provided with a safety-type cover able to support the weight of a person.

## 6.0 SAFETY

### 6.1 ACCIDENT PREVENTION

- 6.1.1 Decks - Decks shall be kept slip-resistant and in good repair, without litter, obstructions, tripping hazards, or sharp edges.
- 6.1.2 Deck Equipment - Ladders, handrails, diving apparatus, lifeguard chairs, slides, and other deck equipment shall be kept secured and in good repair, without sharp edges.
- 6.1.3 Depth Markings - Depth markings shall be maintained to be plainly visible.
- 6.1.4 Entrances - Doors and gates at pool entrances shall be kept closed when not in use, and locked when the pool is not open for use.
- 6.1.5 Glass Objects - Glass objects shall not be permitted in a swimming pool enclosure.

6.1.6 Horseplay - Horseplay and running shall not be permitted.

6.2 SAFETY EQUIPMENT

6.2.1 Lifesaving Equipment - The lifesaving equipment shall be kept in good repair and ready condition. It shall be kept in its established location and shall be used only for the intended purpose.

6.2.2 First Aid Equipment - The first aid kit shall be kept stocked and be readily available at a location identified at the pool. The spineboard shall be kept in good repair and ready condition at the swimming pool . The spineboard should be used only under the direction of a qualified medical technician.

6.2.3 Life Lines - Life lines separating shallow and deep areas shall be kept in good repair. They should be kept in place.

6.2.4 Breathing Apparatus - Self-contained breathing apparatus, where required or provided, shall be kept in good repair and in a ready condition.

6.3 STARTING BLOCKS - Starting blocks shall be removed or made inaccessible, except when competitive swimming or supervised training for competitive swimming is taking place.

6.4 EMERGENCY PLAN - A plan of action for emergencies shall be prepared, put in writing, made known to the staff, and practiced. It should include coordination with the local emergency response provider and instructions regarding proper use of equipment. Where chlorine gas is used the emergency plan should also include provisions to comply with the Code of Federal Regulations for respiratory protection (29CFR 1910.134), and procedures for evacuation and contacting emergency responders in the event of a leak.