2016 Model Aquatic Health Code

Code Language

DESIGN AND CONSTRUCTION

CS267224A

4.0[A] Aquatic Facility Design Standards and Construction

The provisions of MAHC Chapter 4 *(Aquatic Facility Design Standards and Construction)* apply to construction of a new AQUATIC FACILITY or AQUATIC VENUE or SUBSTANTIAL ALTERATION to an existing AQUATIC FACILITY or AQUATIC VENUE, unless otherwise noted.

Note: Section numbers with superscript "A" (e.g., 4.0[A]) denote a corresponding discussion in the* Annex to the Model Aquatic Health Code*.

4.1 Plan Submittal

4.1.1 Plan Submittal

4.1.1.1 Purpose

AQUATIC FACILITY construction plans shall be designed to provide sufficient clarity to indicate the location, nature, and extent of the work proposed.

4.1.1.2 Conform

AQUATIC FACILITY construction plans shall show in detail that it will conform to the provisions of this CODE and relevant laws, ordinances, rules, and regulations, as determined by the AHJ and to protect the health and SAFETY of the facility's BATHERS and PATRONS.

4.1.1.3 Approved Plans

No person shall begin to construct a new AQUATIC FACILITY or shall SUBSTANTIALLY ALTER an existing AQUATIC FACILITY without first having the construction plans detailing the construction or SUBSTANTIAL ALTERATION submitted to and approved by the AHJ.

4.1.1.4 Plan Preparation

All plans shall be prepared by a design professional who is registered or licensed to practice their respective design profession as defined by the state or local laws governing professional practice within the jurisdiction in which the project is to be constructed.

4.1.1.5 Required Statements

All construction plans shall include the following statements:

1) "The proposed AQUATIC FACILITY and all equipment shall be constructed and installed in conformity with the approved plans and specifications or approved amendments," and
2) "No SUBSTANTIAL ALTERATION, changes, additions, or equipment not specified in the approved plans or allowed in the CODE can be made or added until the plans for such SUBSTANTIAL ALTERATION, changes, additions, or equipment are submitted to and approved by the AHJ."

4.1.2 Content of Design Report

4.1.2.1 Basis of Design Report

4.1.2.1.1[A] Names / Addresses

AQUATIC FACILITY plans shall include the name, address, and contact information for the owner, designer, and builder if available at the time of submission.

4.1.2.1.2 Site Information

AQUATIC FACILITY plans shall include site information indicating at a minimum the location of all utilities, wells, topography, natural water features, and potential sources of surface drainage and pollution which may affect the proposed AQUATIC FACILITY.

4.1.2.1.3 Plot Plan

AQUATIC FACILITY plans shall include a site plot plan including:

1) A general map and detailed scaled drawings of the AQUATIC FACILITY site plan or floor plan with detailed locations of the AQUATIC VENUES and AQUATIC FEATURES; and
2) The locations of all water supply facilities, sources of drinking water, public or private sewers, and relative elevations of paved or other walkways and the EQUIPMENT ROOM floor shall be shown on the plans with the elevations of storm and sanitary sewer inverts and street grade.

4.1.2.2 Plans and Specifications

4.1.2.2.1 Drawings

Detailed scaled and dimensional drawings for each individual AQUATIC VENUE shall include an AQUATIC VENUE area plan and layout plan along with dimensioned longitudinal and transverse cross sections of the AQUATIC VENUE.

4.1.2.2.1.1 Operating Conditions

The design documents shall include a record of operating conditions *(water temperature(s), space temperature, space relative humidity, space dew point)* and intended use for each type of venue *(FLAT WATER, AGITATED WATER, HOT WATER)* accepted by both the design engineer and owner/operator.

4.1.2.2.2 Aquatic Venue Attributes

Detailed scaled and dimensional drawings for each individual AQUATIC VENUE shall include location and type of:

1) Inlets,
2) Overflows,
3) Drains,
4) Suction outlets,
5) Overflow gutters or devices,
6) Piping,

7) Designed POOL water elevation,
8) AQUATIC FEATURES such as ladders, stairs, diving boards, SLIDES, and play features,
9) Lighting,
10) POOL markings, and
11) Surface materials

4.1.2.2.3 Area Design

Detailed scaled and dimensional drawings of the AQUATIC FACILITY and for each individual AQUATIC VENUE, as appropriate, shall include location and type of:

1) Design of DECK, curb, or walls enclosing the AQUATIC VENUE,
2) DECK drains,
3) Paved walkways and other hardscape features,
4) Non-slip flooring,
5) AQUATIC VENUE area finishes,
6) Drinking fountains or other sources of drinking water,
7) Entries and exits,
8) Hose bibs,
9) Fences,
10) Telephones, and
11) Area lighting.

4.1.2.2.4 Aquatic Venue Recirculation and Treatment Design

Detailed scaled and dimensional drawings for each individual AQUATIC VENUE shall contain a flow diagram showing the location, plan, elevation, and schematics of:

1) Filters,
2) Pumps,
3) Chemical feeders and interlocks
4) Chemical controllers and interlocks,
5) Secondary DISINFECTION systems, if required,
6) Supplementary DISINFECTION systems, if installed,
7) Ventilation devices or AIR HANDLING SYSTEMS,
8) Heaters,
9) Surge tanks, including operating levels,
10) BACKFLOW prevention assemblies and air gaps,
11) Valves,
12) Piping,
13) Flow meters,
14) Gauges,
15) Thermometers,
16) Test cocks,
17) Sight glasses, and
18) Drainage system for the disposal of AQUATIC VENUE water and filter wastewater.

4.1.2.2.5 Equipment Room Design

Detailed scaled and dimensional drawings for each individual AQUATIC VENUE shall contain a schematic layout of the AQUATIC VENUE EQUIPMENT ROOM *(or equipment area if permitted by the local AHJ)* showing accessibility for installation and maintenance.

4.1.2.2.6 Chemical Storage Space Design

Detailed scaled and dimensional drawings for each individual AQUATIC VENUE shall contain a schematic layout of the AQUATIC FACILITY CHEMICAL STORAGE SPACE(S).

4.1.2.2.7 Hygiene Facility Design

Detailed scaled and dimensional drawings for each AQUATIC FACILITY shall show the location and number of all available HYGIENE FACILITIES provided including dressing rooms, lockers and basket STORAGE, SHOWERS, lavatory, toilet FIXTURES, and DIAPER-CHANGING STATIONS.

4.1.2.3 Technical Specifications

4.1.2.3.1[A] Accompanying Drawings

Technical specifications for the construction of each AQUATIC VENUE and all appurtenances shall accompany the drawings for the AQUATIC FACILITY plans.

4.1.2.3.2[A] Technical Details

The following technical specifications shall be provided for each AQUATIC FACILITY:

1) POOL water temperatures,
2) Space design,
3) Dry bulb and dew point temperatures, and
4) Relative humidity.

4.1.2.3.2.1 Details Not Shown on Plans

Each AQUATIC VENUE shall include all construction details not shown on the plans that relate to the AQUATIC FACILITY:

4.1.2.3.2.2[A] Intended Use

Design of the ventilation and AIR HANDLING SYSTEMS for INDOOR AQUATIC FACILITIES shall include consultation with, and input by, the owner/operator to address intended use, type of venue *(FLAT WATER, AGITATED WATER, HOT WATER)* and intended typical operating water temperature.

4.1.2.3.3 Water Sources

The technical specifications for each AQUATIC FACILITY shall include the sources of all water supplies.

4.1.2.3.4 Area and Volume

Technical specifications shall include the water surface area and volume of each AQUATIC VENUE and associated water features, if applicable.

4.1.2.3.5[A] Theoretical Peak Occupancy

The technical specifications for each AQUATIC FACILITY and each AQUATIC VENUE shall include THEORETICAL PEAK OCCUPANCY, respectively.

4.1.2.3.5.1 Used for Designing Systems

The THEORETICAL PEAK OCCUPANCY for an AQUATIC VENUE shall be used for designing systems that serve BATHERS and PATRONS. *(Note: The specified density factors are the lower limits for determining THEORETICAL PEAK OCCUPANCY.)*

4.1.2.3.5.2 Incorporate Non-Water Related Areas

The THEORETICAL PEAK OCCUPANCY for an AQUATIC FACILITY shall be used for designing systems that serve BATHERS and PATRONS and shall incorporate non-water related areas such as DECKS and other adjacent portions of the AQUATIC FACILITY not associated with the AQUATIC VENUE.

4.1.2.3.5.3[A] Calculating Theoretical Peak Occupancy

The THEORETICAL PEAK OCCUPANCY shall be calculated by dividing the surface area in square feet of the AQUATIC VENUE by the density factor *(D)* that fits the specific AQUATIC VENUE being considered.

Theoretical Peak Occupancy = Aquatic Venue Surface Area / D

The density factors *(D)* are:

Water/BATHER-related:

1) FLAT WATER density factor = 20 ft^2 *(1.9 m^2)* per BATHER.
2) AGITATED WATER density factor = 15 ft^2 *(1.4 m^2)* per BATHER.
3) HOT WATER density factor = 10 ft^2 *(0.9 m^2)* per BATHER.
4) WATERSLIDE LANDING POOL density factor = manufacturer-established capacity at any given time.
5) INTERACTIVE WATER PLAY water density factor = 10 ft^2 *(0.9 m^2)* per BATHER on surface.
6) SURF POOL density factor = manufacturer-established capacity at any given time.
7) Non-water/PATRON-related
8) DECK density factor = 50 ft^2 *(4.6 m^2)* per BATHER.
9) STADIUM SEATING density factor = 6.6 ft^2 *(0.6 m^2)* per BATHER.

4.1.2.3.5.3.1 Density Factor Modification

The density factors in MAHC 4.1.2.3.5.3 may be modified for higher BATHER or PATRON density, but they shall not be modified to result in less BATHERS per square foot than listed for the factors in MAHC 4.1.2.3.5.3.

4.1.2.3.5.3.2 Aquatic Facility Theoretical Peak Occupancy

The THEORETICAL PEAK OCCUPANCY for an AQUATIC FACILITY shall be determined by adding the calculations for each AQUATIC VENUE in the AQUATIC FACILITY.

4.1.2.3.6 Equipment Characteristics and Rating

The technical specifications and supplemental engineering data for each AQUATIC FACILITY and each AQUATIC VENUE shall include:

1) Detailed information on the type, size, operating characteristics, and rating of all mechanical and electrical equipment;
2) Hydraulic computations for head loss in all piping and recirculation equipment; and
3) Pump curves that demonstrate that the selected recirculation pump*(s)* are adequate for the calculated required flows.

4.1.2.3.7 Recirculation Rate and Turnover

The technical specifications for each AQUATIC VENUE shall include the recirculation rate and TURNOVER TIME.

4.1.2.3.8 Filter Media

The technical specifications for each AQUATIC VENUE shall include information on the filter media such as diatomaceous earth, sand, gravel or other approved material.

4.1.2.3.9 Equipment Specifications

The technical specifications for each AQUATIC VENUE shall include information on each piece of equipment associated with that AQUATIC VENUE.

4.1.2.3.10 Safety Equipment Specifications

The technical specifications for each AQUATIC FACILITY shall include information on all aquatic SAFETY equipment.

4.1.2.3.11 Design for Risk Management

The layout for zones of PATRON surveillance as specified in MAHC 6.3.3.1.1 shall be included and must show features or design configurations that can impact PATRON surveillance.

4.1.2.3.12 Other Specifications

The technical specifications for each AQUATIC FACILITY and each AQUATIC VENUE shall include additional information related to the project requested by the AHJ for the purposes of the construction of the AQUATIC FACILITY and each AQUATIC VENUE and all appurtenances.

4.1.3[A] Plan Approval

4.1.3.1 New Construction

4.1.3.1.1 Approval Limitations

The AHJ shall clearly state on the plans the limitations of their approval.

4.1.3.1.2 Other Approvals

The approval shall also state that it is independent of all other required approvals such as Building, Zoning, Fire, Electrical, Structural, and any other approvals as required by local or state law or CODE and the applicant must separately obtain all other required approvals and permits.

4.1.3.1.3 Plan Review Coordination

The AHJ shall coordinate their AQUATIC FACILITY plan review and communicate their approval with other agencies involved in the AQUATIC FACILITY construction.

4.1.3.1.4 Plan Review Report

The AHJ shall provide a plan submission compliance review list to the AQUATIC FACILITY owner with the following information:

1) Categorical items marked satisfactory, unsatisfactory, not applicable, or insufficient information;
2) A comment section keyed to the compliance review list shall detail unsatisfactory and insufficient;
3) Indication of the AHJ approval or disapproval of the AQUATIC FACILITY construction plans;
4) In the case of a disapproval, specific reasons for disapproval and procedure for resubmittal; and
5) Reviewer's name, signature, and date of review.

4.1.3.1.5 Plans Maintained

The AQUATIC FACILITY owner shall maintain at least one set of their own approved plans made available to AHJ on-site for as long as the AQUATIC FACILITY is in operation.

4.1.3.2 Non-Substantial Alterations

4.1.3.2.1 Alteration Review

The AQUATIC FACILITY owner planning a non-SUBSTANTIAL ALTERATION shall contact the AHJ to review proposed changes prior to starting the non-SUBSTANTIAL ALTERATION.

4.1.3.2.2 Alteration Scope

The AQUATIC FACILITY operator shall consult with the AHJ to determine if new or modified plans must be submitted for plan review and approval for other non-SUBSTANTIAL ALTERATIONS proposed.

4.1.3.3[A] Replacements

4.1.3.3.1 Replacement Approval

Prior to replacing equipment, the AQUATIC FACILITY owner shall submit technical verification to the AHJ that all replacement equipment is equal to that which was originally approved and installed.

4.1.3.3.2 Replacement Equipment Equivalency

The replacement of pumps, filters, feeders, controllers, SKIMMERS, flow-meters, valves, or other similar equipment with identical or substantially similar equipment may be done without submission to the AHJ for approval of new or altered AQUATIC FACILITY plans.

4.1.3.3.3 Emergency Replacement

In emergencies, the replacement may be made prior to receiving the AHJ's approval, with the owner accepting responsibility for proper immediate replacement, if the equipment is not deemed equivalent by the AHJ.

4.1.3.3.3.1 Documentation

Where emergency replacements are installed as per MAHC 4.1.3.3.3, the owner shall submit documentation for review and approval of the replacement to the AHJ within 45 days.

4.1.3.3.4 Replacement Record Maintenance

The AHJ shall provide the AQUATIC FACILITY owner written approval or disapproval of the proposed replacement equipment's equivalency.

4.1.3.3.5 Documentation

Documentation of proposed, approved, and disapproved replacements shall be maintained in the AHJ's AQUATIC FACILITY files.

4.1.4[A] Compliance Certificate

4.1.4.1 Construction Compliance Certificate

A certificate of construction compliance shall be submitted to the AHJ for all AQUATIC FACILITY plans for new construction and SUBSTANTIAL ALTERATIONS requiring AHJ approvals.

4.1.4.2 Certificate Preparation

This certificate shall be prepared by a licensed professional and be within the scope of their practice as defined by the state or local laws governing professional practice within the jurisdiction of the permit issuing official.

4.1.4.3 Certificate Statement

The certificate shall also include a statement that the AQUATIC FACILITY, all equipment, and appurtenances have been constructed and/or installed in accordance with approved plans and specifications.

4.1.4.4[A] Systems Commissioning

If commissioning or testing reports for systems such as AQUATIC FACILITY lighting, air handling, recirculation, filtration, and/or DISINFECTION are conducted, then those reports shall be included in furnished documentation.

4.1.4.5 Maintenance

Documentation of AQUATIC FACILITY new construction or SUBSTANTIAL ALTERATION plan compliance shall be maintained in the AHJ's AQUATIC FACILITY files.

4.1.5 Construction Permits

4.1.5.1 Building Permit for Construction

Construction permits required in this CODE and all other applicable permits shall be obtained before any AQUATIC FACILITY may be constructed.

4.1.5.2 Remodeling Building Permit

A construction permit or other applicable permits may be required from the AHJ before SUBSTANTIAL ALTERATION of an AQUATIC FACILITY.

4.1.5.3 Permit Issuance

The AHJ shall issue a permit to the owner to operate the AQUATIC FACILITY:

1) After receiving a certificate of completion from the design professional verifying information submitted, and
2) When new construction, SUBSTANTIAL ALTERATIONS, or annual renewal requirements of this CODE have been met.

4.1.5.4 Permit Denial

The permit *(license)* to operate may be withheld, revoked or denied by the AHJ for noncompliance of the AQUATIC FACILITY with the requirements of this CODE, and the owner will be provided:

1) Specific reasons for disapproval and procedure for resubmittal;
2) Notice of the rights to appeal this denial and procedures for requesting an appeal; and
3) Reviewer's name, signature and date of review and denial.

4.1.5.5 Documentation

Documentation of AQUATIC FACILITY permit renewal or denial shall be maintained in the AHJ's AQUATIC FACILITY files.

4.2 Materials

4.2.1 Aquatic Venues

4.2.1.1 Construction Material

AQUATIC VENUES shall be constructed of reinforced concrete or impervious and structurally sound material*(s),* which provide a smooth, easily cleaned, watertight structure capable of withstanding the anticipated stresses/loads for full and empty conditions taking into

consideration climatic, hydrostatic, seismic, and the integration of the AQUATIC VENUE with other structural conditions and as required by applicable CODES.

4.2.1.2 Durability

All materials shall be inert, non-toxic, resistant to corrosion, impervious, enduring, and resistant to damages related to environmental conditions of the installation region.

4.2.1.3 Areas Subject to Freezing

Where located in areas subject to freezing, AQUATIC VENUES and appurtenances shall be protected and designed from damage due to freezing.

4.2.1.4 Competitive Pools

Competitive or lap POOLS may have lane markings and end wall targets installed in accordance with FINA, NCAA, USA Swimming, NFSHSA, or other recognized STANDARD.

4.2.1.5[A] Design Parameters

Any graphics, color, or finish incorporated into the construction of a POOL or painted on the floor or walls must not prevent the detection of a BATHER in distress, algae, sediment, or other objects in the AQUATIC VENUE.

4.2.1.5.1 Permission in Writing

Permission in writing from the AHJ for the use of graphics that do not comply with the requirements of this CODE shall be obtained before the graphics are used.

4.2.1.6 Watertight

POOLS shall be designed in such a way to maintain their ability to retain the designed amount of water.

4.2.1.7[A] Smooth Finish

All vertical walls shall have a durable finish suitable for regular scrubbing and cleaning at the waterline.

4.2.1.7.1 Daily Cleaning

The finish shall be able to withstand daily brushing, scrubbing, and cleaning of the surface in accordance with the manufacturer's recommendations.

4.2.1.7.2 Skimmer Pools

SKIMMER POOLS shall have a six inch *(152 mm)* to 12 inch *(305 mm)* high waterline finish that meets the requirements of MAHC 4.2.1.7 and 4.2.1.7.1.

4.2.1.7.3 Gutter / Perimeter Overflow Systems

Gutter or POS shall have a minimum finish height of two inches (*51 mm)* that meets the requirements of MAHC 4.2.1.7 and 4.2.1.7.1.

4.2.1.7.4 Dark Colors

If dark colors in excess of what is required in this CODE are used for the POOL finish, these colors shall not extend more than 12 inches *(305 mm)* below the waterline.

4.2.1.8[A] Slip Resistant

POOL floors in areas less than three feet *(0.9 m)* deep shall have a slip resistant finish with a minimum dynamic coefficient of friction at least equal to the requirements of ANSI A137.1-2012 of 0.42 as measured by the DCOF AcuTest.

4.2.1.9 Stainless Steel, Vinyl, PVC-P or PVC Pools

Stainless steel, vinyl, PVC-P, or PVC panel and liner POOL finish systems shall be acceptable provided that the system is installed on top of approved materials and design requirements as listed within this section or approved by the AHJ.

4.2.1.9.1 Damaged

If at any time the liner system is damaged or cut in such a way that its integrity is compromised, the POOL shall be shut down until the system is fully repaired.

4.2.1.10 Not Permitted

Wood, sand, or earth shall not be permitted as an interior finish.

4.2.2 Indoor Aquatic Facility

4.2.2.1 Interior Finish

4.2.2.1.1 Relative Humidity

The interior finish of an INDOOR AQUATIC FACILITY shall be designed for an indoor relative humidity as not less than 80%.

4.2.2.2[A] Condensation Prevention

4.2.2.2.1[A] Cold Weather

INDOOR AQUATIC FACILITY building envelope construction shall include a vapor-retarder/insulation arrangement to assist in preventing the condensation of water on inside building surfaces under the coldest outdoor conditions based on the ASHRAE climate data for the project locale or nearest reporting city and the highest design indoor relative humidity.

4.2.2.2.2[A] Paint or Coating

Where a paint or coating serves as the vapor retarder of an INDOOR AQUATIC FACILITY, the paint or coating shall be applied so as to produce a permeability rating of 0.2 U.S. perm *(11.4 $ng \cdot s^{-1} \cdot m^{-2} \cdot Pa^{-1}$)* or less.

4.2.2.2.2.1 Application

The paint or coating shall be applied according to the manufacturer's recommendations for use as a vapor retarder.

4.2.2.2.3 Perforated Interior-Finish Material

Where a perforated interior-finish material is used in an INDOOR AQUATIC FACILITY, as for acoustic effects, the perforated material shall not be considered to be a vapor retarder unless it has a listed permeability rating less than 0.2 U.S. perm *(11.4 ng·s^{-1}·m^{-2}·Pa^{-1})*.

4.2.2.3 Mechanical Systems

4.2.2.3.1 Equipment Rooms

For EQUIPMENT ROOMS, see MAHC 4.9.1.

4.2.2.3.2 Chemical Storage Spaces

For CHEMICAL STORAGE SPACES, see MAHC 4.9.2.

4.2.2.3.3[A] Indoor Aquatic Facility Air Pressure

AQUATIC FACILITY AIR HANDLING SYSTEM design, construction, and installation shall comply with the 2011 ASHRAE Applications Handbook on Natatorium Design ASHRAE Standard 62.1, *Ventilation for Acceptable Indoor Air Quality*, and/or applicable local CODES with additional requirements as stated in section MAHC 4.6.2.

4.2.2.3.3.1 Chemical Storage Space Air Pressure

AIR HANDLING SYSTEM design for CHEMICAL STORAGE SPACES shall conform to the International Mechanical Code or Uniform Mechanical Code, and either the International Fire Code or the Uniform NFPA 1 Fire Code, and any applicable local CODES.

4.2.2.3.4[A] Air Ducts

Where air ducts are required, they shall be resistant to corrosion from the airborne chemicals.

4.2.2.3.4.1 Material Options

Coated steel, aluminum, and fabric ducts may be options to consider.

4.2.2.3.4.2 Insulated Exterior

Ducts shall be insulated on the exterior of the duct with a mold-resistant material where the surface temperature of the duct is capable of being less than the airstream temperature within the duct.

4.2.2.3.5 Filters

Filters for outdoor-air intake shall be rated moisture-resistant.

4.2.2.4[A] Indoor Aquatic Facility Doors

4.2.2.4.1 Corrosion-Resistant

INDOOR AQUATIC FACILITY doors shall either be constructed of corrosion-resistant materials or have a covering or coating to withstand humid and CORROSIVE environments which is acceptable to the AHJ.

4.2.2.4.2 Uncontrolled Condensation

INDOOR AQUATIC FACILITY doors which may be exposed to temperatures below INDOOR AQUATIC FACILITY-air dew point shall have thermal breaks, insulation, and/or glazing as necessary to minimize the risk of uncontrolled condensation.

4.2.2.4.2.1 Heating Systems

Exception: Other doors shall be acceptable, subject to approval by the AHJ, where heating systems are so arranged as to maintain such doors above the maximum design dew point of the INDOOR AQUATIC FACILITY air.

4.2.2.4.3 Biological Contaminants

INDOOR AQUATIC FACILITY doors and door-frame construction shall not contribute to the growth of biological CONTAMINANTS.

4.2.2.4.4 Air Leakage

INDOOR AQUATIC FACILITY doors and/or door frames shall be equipped with seals and/or gaskets to minimize air leakage when the door is closed.

4.2.2.4.5 Automatic Door Closer

All pedestrian doors around the INDOOR AQUATIC FACILITY perimeter shall be equipped with an automatic door closer capable of closing the door completely without human assistance.

4.2.2.4.5.1 Difference in Air Pressure

Door closers must be able to close the door against the specified difference in air pressure between the INDOOR AQUATIC FACILITY and other INTERIOR SPACES.

4.2.2.5[A] Indoor Aquatic Facility Windows

4.2.2.5.1 Frames

INDOOR AQUATIC FACILITY window frames shall be constructed of suitable materials or shall have a suitable covering or coating to withstand the expected atmosphere.

4.2.2.5.2 Biological Contaminants

INDOOR AQUATIC FACILITY window frames shall be constructed of materials that do not contribute to the growth of biological CONTAMINANTS.

4.2.2.5.3 Thermal Breaks

INDOOR AQUATIC FACILITY window frames shall have thermal breaks or be otherwise constructed to minimize the risk of uncontrolled condensation.

4.2.2.6 Indoor Aquatic Facility Electrical Systems and Components

Refer to MAHC 4.6.3

4.3 Equipment Standards

4.3.1 General

4.3.1.1[A] Accredited Standards

Where applicable, all equipment used or proposed for use in AQUATIC FACILITIES governed under this CODE shall be:

1) Of a proven design and construction, and
2) Listed and labeled to a specific STANDARD for the specified equipment use by an ANSI-accredited certification organization.

4.3.1.2 No Standards

Where STANDARDS do not exist, technical documentation shall be submitted to the AHJ to demonstrate acceptability for use in AQUATIC FACILITIES.

4.3.1.2.1 Proof of Acceptability

The AHJ shall have the authority to require tests, as proof of acceptability.

4.3.2[A] Recirculation Systems and Equipment

4.3.2.1 ANSI-Accredited Testing

Where applicable, all equipment used or proposed to use in AQUATIC FACILITIES shall be of proven design and construction.

4.3.2.1.1 Listed and Labeled

Where applicable, all equipment used or proposed to use in AQUATIC FACILITIES shall be listed and labeled by an ANSI-accredited certification organization, or have EPA registration where applicable.

4.3.2.2 Suitable for Intent

RECIRCULATION SYSTEMS and all materials used therein shall be suitable for their intended use and be installed in accordance with this CODE, as listed and labeled to a specific STANDARD by an ANSI-Accredited certification organization, and as specified by the manufacturer.

4.4 Aquatic Facility and Venue Operation and Maintenance [N/A]

4.5 Aquatic Venue Structure

4.5.1[A] Design for Risk Management

Design of AQUATIC FACILITIES and/or AQUATIC VENUE*(s)* shall include consultation with and input by the owner and/or an aquatic risk management consultant and address operational considerations such as the layout of zones of PATRON surveillance.

4.5.1.1 Basic Requirements

The AQUATIC VENUE shape shall provide for the SAFETY of swimmers, thorough and complete circulation of the water, the ability to clean and maintain the AQUATIC VENUE, and the supervision of BATHERS and PATRONS using the AQUATIC VENUE.

4.5.1.2 Water Clarity

The water in an AQUATIC VENUE shall be sufficiently clear such that the bottom is visible while the water is static.

4.5.1.2.1 Observing Water Clarity

To make this observation, a four inch x four inch square *(10.2 cm x 10.2 cm)* marker tile in a contrasting color to the POOL floor or main suction outlet shall be located at the deepest part of the POOL.

4.5.1.2.2 Pools Over Ten Feet Deep

For POOLS over 10 feet deep *(3.0 m)* an eight inch by eight inch square *(20.3 cm x 20.3 cm)* marker tile in a contrasting color to the POOL floor or main suction outlet shall be located at the deepest part of the POOL.

4.5.1.2.3 Visible

This reference point shall be visible at all times at any point on the DECK up to 30 feet *(9.1 m)* away in a direct line of sight from the tile or main drain.

4.5.1.2.4 Spas

For SPAS, this test shall be performed when the water is in a non-turbulent state and bubbles have been allowed to dissipate.

4.5.2 Bottom Slope

4.5.2.1[A] Under Five Feet

In water depths under five feet *(1.5 m)*, the slope of the floor of all POOLS shall not exceed one foot *(30.5 cm)* vertical drop for every 12 feet *(3.7 m)* horizontal.

4.5.2.2 Five Feet or Over

In water depths five foot *(1.5 m)* and greater, the slope of the floors of all POOLS shall not exceed one foot *(30.5 cm)* vertical to three feet *(0.9 m)* horizontal.

Exception: POOLS designed and used for competitive diving shall be designed to meet the STANDARDS of the sanctioning organization *(such as NFSHSA, NCAA, USA Diving, or FINA)*.

4.5.2.3[A] Drain

POOLS shall be designed so that they drain without leaving puddles or trapped standing water.

4.5.3 Pool Access / Egress

4.5.3.1[A] Accessibility

Each POOL shall have a minimum of two means of access and egress with the exception of:

1) Waterslide landing pools,
2) Waterslide runouts, and
3) Wave pools.

4.5.3.2 Acceptable Means

Acceptable means of access / egress shall include stairs / handrails, grab rails / RECESSED STEPS, ladders, ramps, swimouts, and zero-depth entries.

4.5.3.3 Large Venues

For POOLS wider than 30 feet *(9.1 m)*, such means of access / egress shall be provided on each side of the POOL.

4.5.3.3.1 Distance Apart

For POOLS wider than 30 feet *(9.1 m)*, such means of access / egress shall not be more than 75 feet *(22.9 m)* apart.

4.5.4 Stairs

4.5.4.1 Slip Resistant

Where provided, stairs shall be constructed with slip-resistant materials.

4.5.4.2 Outlined Edges

The leading horizontal and vertical edges of stair treads shall be outlined with slip-resistant contrasting tile or other permanent marking of not less than one inch *(25.4 mm)* and not greater than two inches *(50.8 mm)*.

4.5.4.3[A] Deep Water

Where stairs are provided in POOL water depths greater than five feet *(1.5 m)*, they shall be recessed and not protrude into the swimming area of the POOL.

4.5.4.3.1 Lowest Tread

Where stairs are provided in POOL water depths greater than five feet *(1.5 m)*, the lowest tread shall be not less than four feet *(1.2 m)* below normal water elevation.

4.5.4.4 Rectangular Stairs

Traditional rectangular stairs shall have a minimum uniform horizontal tread depth of 12 inches *(30.5 cm)*, and a minimum unobstructed tread width of 24 inches *(61.0 cm)*.

4.5.4.5[A] Dimensions

Dimensions of stair treads for other types of stairs shall conform to requirements of

1) MAHC Table 4.5.4.5,
2) MAHC Figure 4.5.4.5.1,
3) MAHC Figure 4.5.4.5.2, and
4) MAHC Figure 4.5.4.5.3.

Table 4.5.4.5: Required Dimensions for Stair Treads and Risers

Dimensions	T-1 Standard	T-1 Convex, Concave, Triangular	T-2	W-1	H-1
Minimum	12 inches *(30.5 cm)*	21 inches *(53.3 cm)*	12 inches *(30.5 cm)*	24 inches *(61.0 cm)*	6 inches *(15.2 cm)*
Maximum	18 inches *(45.7 cm)*	24 inches *(61.0 cm)*	16 inches *(40.6 cm)*	N/A	12 inches *(30.5 cm)*

Figure 4.5.4.5.1: Stair Treads and Risers

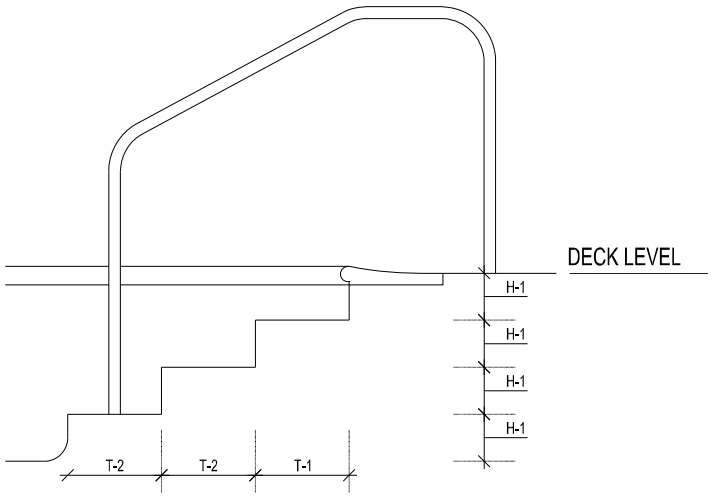


Figure 4.5.4.5.2: Stair Treads

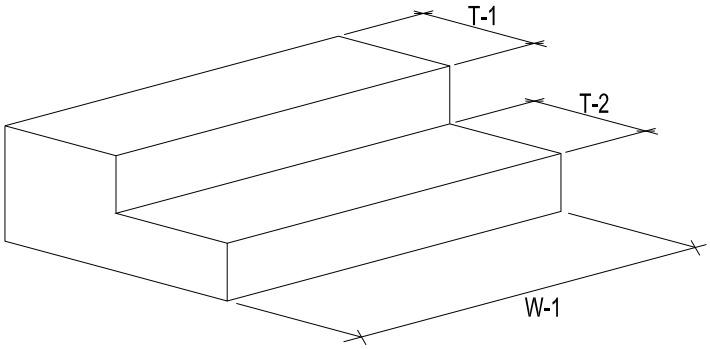
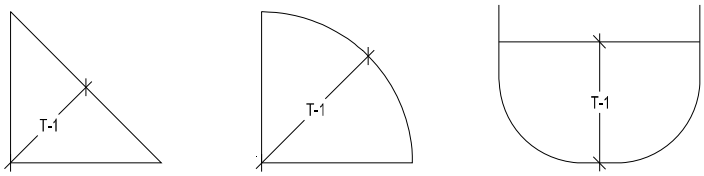


Figure 4.5.4.5.3: Unique Stair Treads



4.5.4.6 Stair Risers

Stair risers shall have a minimum uniform height of six inches *(15.2 cm)* and a maximum height of 12 inches *(30.5 cm)*, with a tolerance of ½ inches *(12.7 mm)* between adjacent risers.

4.5.4.6.1 Transitional Areas

Stairs shall not be used underwater to transition between two sections of POOL of different depths.

Note: The bottom riser may vary due to potential cross slopes with the POOL floor; however, the bottom step riser may not exceed the maximum allowable height required by this section.

4.5.4.7 Top Surface

The top surface of the uppermost stair tread shall be located not more than 12 inches *(30.5 cm)* below the POOL coping or DECK.

4.5.4.8[A] Perimeter Gutter Systems

For POOLS with PERIMETER GUTTER SYSTEMS, the gutter may serve as a step, provided that the gutter is provided with a grating or cover and conforms to all construction and dimensional requirements herein specified.

4.5.5 Handrails

4.5.5.1 Provided

Handrail*(s)* shall be provided for each set of stairs.

4.5.5.2 Corrosion-resistant

Handrails shall be constructed of corrosion-resistant materials, and anchored securely.

4.5.5.3[A] Upper Railing

The upper railing surface of handrails shall extend above the POOL coping or DECK a minimum of 28 inches *(71.1 cm)*.

4.5.5.4 Wider Than Five feet

Stairs wider than five feet *(1.5 m)* shall have at least one additional handrail for every 12 feet *(3.7 m)* of stair width.

4.5.5.5[A] ADA Accessibility

Handrail outside dimensions intended to serve as a means of ADA accessibility shall conform to requirements of MAHC 4.5.5.7.

4.5.5.6 Support

Handrails shall be designed to resist a load of 50 pounds *(22.7 kg)* per linear foot applied in any direction and independently a single concentrated load of 200 pounds (90.7 kg) applied in any direction at any location.

4.5.5.6.1 Transfer Loads

Hand rails shall be designed to transfer these loads through the supports to the POOL or DECK structure.

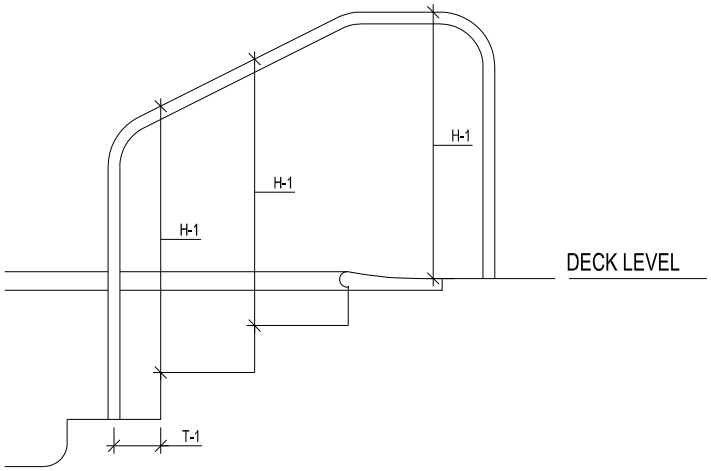
4.5.5.7[A] Dimensions

Dimensions of handrails shall conform to requirements of MAHC Table 4.5.5.7 and MAHC Figure 4.5.5.7.1.

Table 4.5.5.7: Stair Handrail Dimensions

Dimensions	T-1	H-1
Minimum	3 inches *(7.6 cm)*	34 inches *(86.4 cm)*
Maximum	N/A	38 inches *(96.5 cm)*

Figure 4.5.5.7.1: Stair Handrails



4.5.6 Grab Rails

4.5.6.1 Corrosion-Resistant

Where grab rails are provided, they shall be constructed of corrosion-resistant materials.

4.5.6.2 Anchored

Grab rails shall be anchored securely.

4.5.6.3 Provided

Grab rails shall be provided at both sides of RECESSED STEPS.

4.5.6.4 Clear Space

The horizontal clear space between grab rails shall be not less than 18 inches *(45.7 cm)* and not more than 24 inches *(61.0 cm)*.

4.5.6.5 Upper Railing

The upper railing surface of grab rails shall extend above the POOL coping or DECK a minimum of 28 inches *(71.1 cm)*.

4.5.6.6 Support

Grab rails shall be designed to resist a load of 50 pounds *(22.7 kg)* per linear foot applied in any direction and independently a single concentrated load of 200 pounds *(90.7 kg)* applied in any direction at any location.

4.5.6.6.1 Transfer Loads

Grab rails shall be designed to transfer these loads through the supports to the POOL or DECK structure.

4.5.7 Recessed Steps

4.5.7.1 Slip-Resistant

RECESSED STEPS shall be slip-resistant.

4.5.7.2 Easily Cleaned

RECESSED STEPS shall be designed to be easily cleaned.

4.5.7.3 Drain

RECESSED STEPS shall drain into the POOL.

4.5.7.4[A] Dimensions

Dimensions of RECESSED STEPS shall conform to requirements of:

1) MAHC Table 4.5.7.4,
2) MAHC Figure 4.5.7.4.1, and
3) MAHC Figure 4.5.7.4.2.

Table 4.5.7.4: Recessed Step Dimensions

Dimensions	H-1	H-2	W-1	D-1
Minimum	6 inches *(15.2 cm)*	5 inches *(12.7 cm)*	12 inches *(30.5 cm)*	5 inches *(12.7 cm)*
Maximum	12 inches *(30.5 cm)*	N/A	N/A	N/A

Figure 4.5.7.4.1: Recessed Step Dimensions

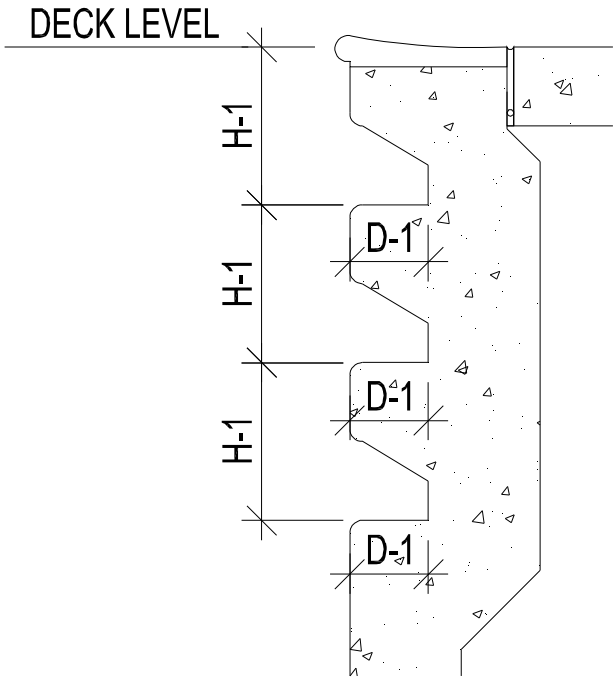
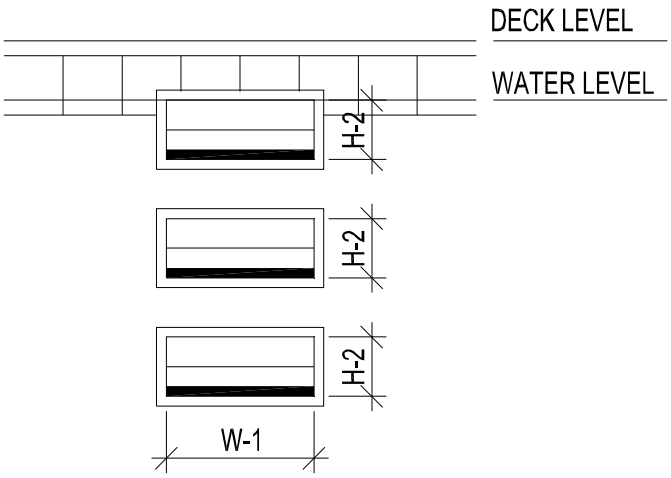


Figure 4.5.7.4.2: Recessed Step Dimensions



4.5.7.5 Uniformly Spaced

RECESSED STEPS shall be uniformly spaced not less than six inches *(15.2 cm)* and not more than 12 inches *(30.5 cm)* vertically along the POOL wall.

4.5.7.6 Uppermost Step

The top surface of the uppermost RECESSED STEP shall be located not more than 12 inches *(30.5 cm)* below the POOL coping or DECK.

4.5.7.7 Perimeter Gutter Systems

For POOLS with PERIMETER GUTTER SYSTEMS, the gutter may serve as a step, provided that the gutter is provided with a grating or cover and conforms to all construction and dimensional requirements herein specified.

4.5.8 Ladders

4.5.8.1 General Guidelines for Ladders

4.5.8.1.1 Corrosion-Resistant

Where provided, ladders shall be constructed of corrosion-resistant materials.

4.5.8.1.2 Anchored

Ladders shall be anchored securely to the DECK.

4.5.8.2[A] Ladder Handrails

4.5.8.2.1 Two Handrails Provided

Ladders shall have two handrails.

4.5.8.2.2 Clear Space

The horizontal clear space between handrails shall be not less than 17 inches *(43.2 cm)* and not more than 24 inches *(61.0 cm)*.

4.5.8.2.3 Upper Railing

The upper railing surface of handrails shall extend above the POOL coping or DECK a minimum of 28 inches *(71.7 cm)*.

4.5.8.2.4[A] Pool Wall

The clear space between handrails and the POOL wall shall be not less than three inches *(7.6 cm)* and not more than six inches *(15.2 cm)*.

4.5.8.2.5[A] Support

Ladders shall be designed to resist a load of 50 pounds *(22.7 kg)* per linear foot applied in any direction and independently a single concentrated load of 200 pounds *(90.7 kg)* applied in any direction at any location.

4.5.8.2.5.1 Transfer Loads

Ladders shall be designed to transfer these loads through the supports to the POOL or DECK structure.

4.5.8.3 Ladder Treads

4.5.8.3.1 Slip Resistant

Ladder treads shall be slip-resistant.

4.5.8.3.2 Tread Depth

Ladder treads shall have a minimum horizontal tread depth of 1.5 inches *(3.8 cm).*

4.5.8.3.2.1 Distance Between Tread and Pool Wall

The distance between the horizontal tread and the POOL wall shall not be greater than four inches *(10.2 cm)*.

4.5.8.3.3 Uniformly Spaced

Ladder treads shall be uniformly spaced not less than seven inches *(17.8 cm)* and not more than 12 inches *(30.5 cm)* vertically at the handrails.

4.5.8.3.4 Upmost Ladder Tread

The top surface of the upmost ladder tread shall be located not more than 12 inches *(30.5 cm)* below the POOL coping, gutter, or DECK.

4.5.9 Zero Depth (Sloped) Entries

4.5.9.1 Slip Resistant

Where ZERO DEPTH ENTRIES are provided, they shall be constructed with slip-resistant materials.

4.5.9.2 Maximum Floor Slope

ZERO DEPTH ENTRIES shall have a maximum floor slope of 1:12, consistent with the requirements of MAHC 4.5.2.1.

4.5.9.2.1 Slope Changes

Changes in floor slope shall be permitted.

4.5.9.3 Trench Drains

Trench drains shall be used along ZERO DEPTH ENTRIES at the waterline to facilitate surface skimming.

4.5.9.3.1 Flat or Follow Slope

The trenches may be flat or follow the slope of the ZERO DEPTH ENTRY.

4.5.9.3.2 Handholds

Any handholds that present a trip hazard shall not be continuous along the ZERO DEPTH ENTRY.

4.5.10 Disabled Access

4.5.10.1[A] Conform to ADA Standards

Access for disabled persons shall conform to ADA Standards as approved by the Department of Justice.

4.5.11 Color and Finish

4.5.11.1[A] White or Light Pastel

Floors and walls below the water line shall be white or light pastel in color such that from the POOL DECK a BATHER is visible on the POOL floor and the following items can be identified:

1) Algae growth, debris or dirt within the POOL, and
2) CRACKS in the surface finish of the POOL, and
3) Marker tiles defined in MAHC 4.5.1.2.

4.5.11.1.1[A] Munsell Color Value

The finish shall be at least 6.5 on the Munsell color value scale.

4.5.11.1.2 Exceptions

An exception shall be made for the following AQUATIC VENUE components:

1) Competitive lane markings,
2) Dedicated competitive diving well floors,
3) Step or bench edge markings,
4) POOLS shallower than 24 inches *(61.0 cm)*,
5) Water line tiles,
6) WAVE POOL and SURF POOL depth change indicator tiles, or
7) Other approved designs.

4.5.11.1.3 Darker Colors

Munsell color values less than 6.5 or designs such as rock formations may be permitted by the AHJ as long as the criteria in MAHC 4.5.11.1 are met.

4.5.12 Walls

4.5.12.1 Plumb

POOL walls shall be plumb within a +/- three degree tolerance to a water depth of at least five feet *(1.5 m)*, unless the wall design requires structural support ledges and slopes below to support the upper wall. Refer to MAHC Figure 4.5.12.4.

4.5.12.2 Support Ledges and Slopes

All structural support ledges and slopes of the wall shall fall entirely within a plane slope from the water line at not greater than a +/- three degree tolerance.

4.5.12.2.1 Contrasting Color

A contrasting color shall be provided on the edges of any support ledge to draw attention to the ledge for BATHER SAFETY.

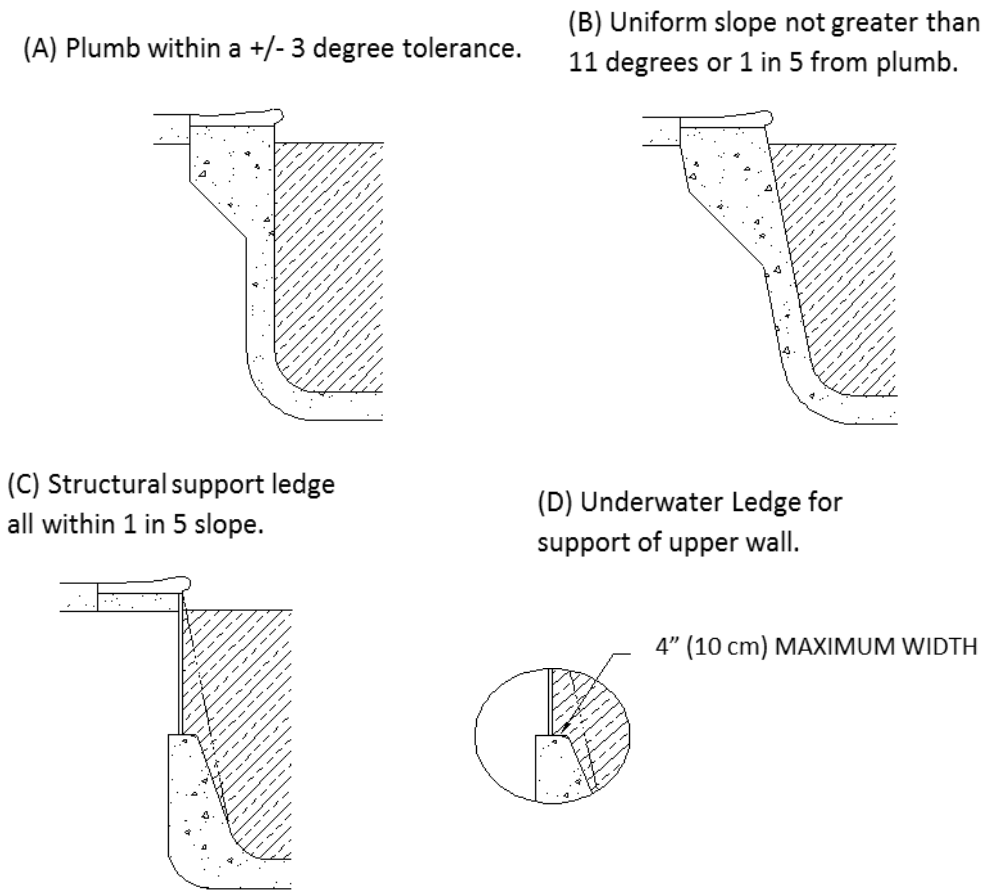
4.5.12.3 Rounded Corners

All corners created by adjoining walls shall be rounded or have a radius in both the vertical and horizontal dimensions to eliminate sharp corners.

4.5.12.4[A] No Projections

There shall be no projections from a POOL wall with the exception of structures or elements such as stairs, grab rails, ladders, handholds, PENINSULAS, WING WALLS, underwater lights, SAFETY ropes, WATERSLIDES, play features, other approved POOL amenities, UNDERWATER BENCHES, and UNDERWATER LEDGES as described in this section. Refer to MAHC Figure 4.5.12.4.

Figure 4.5.12.4: Pool Walls



4.5.13[A] Structural Stability

4.5.13.1 Withstand Loads

POOLS shall be designed to withstand the reasonably anticipated loads imposed by POOL water, BATHERS, and adjacent soils or structures.

4.5.13.2 Hydrostatic Relief Valve

A hydrostatic relief valve and/or suitable under drain system shall be provided where the water table exerts hydrostatic pressure to uplift the POOL when empty or drained.

4.5.13.3 Freezing

POOLS and related circulation piping shall be designed with a winterizing strategy when in an area subject to freeze/thaw cycles.

4.5.14[A] Handholds

4.5.14.1 Handholds Provided

Where not otherwise exempted, every POOL shall be provided with handholds *(PERIMETER GUTTER SYSTEM, coping, horizontal bars, recessed handholds, cantilevered DECKING)* around the perimeter of the POOL where the water depth at the wall exceeds 24 inches *(61.0 cm)*.

4.5.14.1.1 Installed

These handholds shall be installed not greater than nine inches *(22.9 cm)* above, or three inches *(7.6 cm)* below static water level.

4.5.14.2 Horizontal Recesses

Horizontal recesses may be used for handholds provided they are a minimum of 24 inches *(61.0 cm)* long, a minimum of four inches *(10.2 cm)* high and between two inches *(5.1 cm)* and three inches *(7.6 cm)* deep.

4.5.14.2.1 Drain

Horizontal recesses shall drain into the POOL.

4.5.14.2.2 Consecutive Recesses

Horizontal recesses need not be continuous, but consecutive recesses shall be separated by no more than 12 inches *(30.5 cm)* of wall.

4.5.14.3 Decking

Where PERIMETER GUTTER SYSTEMS are not provided, a coping or cantilevered DECKING of reinforced concrete or material equivalent in strength and durability, with rounded, slip-resistant edges shall be provided.

4.5.14.4 Coping Dimensions

The overhang for coping or cantilevered DECKING shall not be greater than two inches *(50 mm)* from the vertical plane of the POOL wall, nor less than one inch *(2.5 cm)*.

4.5.14.5 Coping Thickness

The overhang for coping or cantilevered DECKING shall not exceed 3.5 inches *(8.9 cm)* in thickness for the last two inches *(5.1 cm)* of the overhang.

4.5.15 Infinity Edges

4.5.15.1[A] Perimeter Restrictions

Not more than fifty percent *(50%)* of the POOL perimeter shall incorporate an INFINITY EDGE detail, unless an adjacent and PATRON accessible DECK space conforming to MAHC 4.8.1 is provided.

4.5.15.2 Length

The length of an INFINITY EDGE shall be no more than 30 feet *(9.1 m)* long when in water depths greater than five feet *(1.5 m)*.

4.5.15.2.1 Shallow Water

No maximum distance is enforced for the length of INFINITY EDGES in shallow water five feet *(1.5 m)* and less.

4.5.15.3[A] Handholds

Handholds conforming to the requirements of MAHC 4.5.14 shall be provided for INFINITY EDGES, which may be separate from, or incorporated as part of the INFINITY EDGE detail.

4.5.15.4 Construction Guidelines

Where INFINITY EDGES are provided, they shall be constructed of reinforced concrete or other impervious and structurally rigid material*(s)*, and designed to withstand the loads imposed by POOL water, BATHERS, and adjacent soils or structures.

4.5.15.5 Overflow Basins

Troughs, basins, or capture drains designed to receive the overflow from INFINITY EDGES shall be watertight and free from STRUCTURAL CRACKS.

4.5.15.5.1 Finish

Troughs, basins, or capture drains designed to receive the overflow from INFINITY EDGES shall have a non-toxic, smooth, and slip-resistant finish.

4.5.15.6[A] Maximum Height

The maximum height of the wall outside of the INFINITY EDGE shall not exceed 30 inches *(76.2 cm)* to the adjacent grade and capture drain.

4.5.16[A] Underwater Benches

4.5.16.1[A] Slip Resistant

Where provided, UNDERWATER BENCHES shall be constructed with slip-resistant materials having a minimum dynamic coefficient of friction at least equal to the requirements of ANSI A137.1-2012 of 0.42 as measured by the DCOF AcuTest.

4.5.16.2 Outlined Edges

The leading horizontal and vertical edges of UNDERWATER BENCHES shall be outlined with slip-resistant color contrasting tile or other permanent marking of not less than ¾ inch *(1.9 cm)* and not greater than two inches *(5.1 cm)*.

4.5.16.3[A] Maximum Water Depth

UNDERWATER BENCHES may be installed in areas of varying depths, but the maximum POOL water depth in that area shall not exceed five feet *(1.5 m).*

4.5.16.4 Maximum Seat Depth

The maximum submerged depth of any seat or sitting bench shall be 20 inches *(50.8 cm)* measured from the water line.

4.5.17 Underwater Ledges

4.5.17.1[A] Slip Resistant

Where UNDERWATER TOE LEDGES are provided to enable swimmers in deep water to rest or to provide structural support for an upper wall, they shall be constructed with slip-resistant materials.

4.5.17.2 Protrude

UNDERWATER TOE LEDGES for resting that are recessed or protrude beyond the vertical plane of the POOL wall shall meet the criteria for slip resistance and tread depth outlined in this section.

4.5.17.3[A] Five Feet or Greater

UNDERWATER TOE LEDGES for resting shall only be provided within areas of a POOL with water depths of five feet *(1.5 m)* or greater.

4.5.17.3.1 Underwater Toe Ledge

UNDERWATER TOE LEDGES shall start no earlier than four lineal feet *(1.2 m)* to the deep side of the five foot *(1.5 m)* slope break.

4.5.17.3.2 Below Water Level

UNDERWATER TOE LEDGES shall be at least four feet *(1.2 m)* below static water level.

4.5.17.4[A] Structural Support

UNDERWATER LEDGES for structural support of upper walls shall be allowed.

4.5.17.5 Outlined

The edges of UNDERWATER TOE LEDGES shall be outlined with slip-resistant color contrasting tile or other permanent marking of not less than one inch *(2.5 cm)* and not greater than two inches *(5.1 cm)*.

4.5.17.5.1 Visible

If they project past the plane of the POOL wall, the edges of UNDERWATER TOE LEDGES shall be clearly visible from the DECK.

4.5.17.6 Tread Depths

UNDERWATER TOE LEDGES shall have a maximum uniform horizontal tread depth of four inches *(10.2 cm)*. See MAHC Figure 4.5.12.4.

4.5.18[A] Underwater Shelves

4.5.18.1 Immediately Adjacent

UNDERWATER SHELVES may be constructed immediately adjacent to water shallower than five feet *(1.5 m)*.

4.5.18.2 Nosing

UNDERWATER SHELVES shall have a slip-resistant, color contrasting nosing at the leading horizontal and vertical edges on both the top of horizontal edges and leading vertical edges and should be viewable from the DECK or from underwater.

4.5.18.3 Maximum Depth

UNDERWATER SHELVES shall have a maximum depth of 24 inches *(61.0 cm)*.

4.5.19[A] Depth Markers and Markings

4.5.19.1 Location

4.5.19.1.1 Markings

POOL water depths shall be clearly and permanently marked at the following locations:

1) Minimum depth,
2) Maximum depth,
3) On both sides and at each end of the POOL and,
4) At the break in the floor slope between the shallow and deep portions of the POOL.

4.5.19.1.2[A] Depth Measurements

Depth markers shall be located on the vertical POOL wall and positioned to be read from within the POOL.

4.5.19.1.3[A] Below Handhold

Where depth markings cannot be placed on the vertical wall above the water level, other means shall be used so that the markings will be plainly visible to persons in the POOL.

4.5.19.1.4 Coping or Deck

Depth markers shall also be located on the POOL coping or DECK within 18 inches *(45.7 cm)* of the POOL structural wall or perimeter gutter.

4.5.19.1.5 Read on Deck

Depth markers shall be positioned to be read while standing on the DECK facing the POOL.

4.5.19.1.6 Twenty-Five Foot Intervals

Depth markers shall be installed at not more than 25 foot *(7.6 m)* intervals around the POOL perimeter edge and according to the requirements of this section.

4.5.19.1.6.1 Five feet or Less

For water less than five feet *(1.5 m)* in depth, the depth shall be marked at one foot *(30.5 cm)* depth intervals.

4.5.19.2 Construction / Size

4.5.19.2.1 Durable

Depth markers shall be constructed of a durable material resistant to local weather conditions.

4.5.19.2.2 Slip Resistant

Depth markers shall be slip resistant when they are located on horizontal surfaces.

4.5.19.2.3[A] Color and Height

Depth markers shall have letters and numbers with a minimum height of four inches *(10. 2 cm)* of a color contrasting with background.

4.5.19.2.4[A] Feet and Inches

Depth markers shall be marked in units of feet and inches.

4.5.19.2.4.1 Abbreviations

Abbreviations of “FT” and “IN” may be used in lieu of “FEET” and “INCHES.”

4.5.19.2.4.1.1 Abbreviations

Symbols for feet *(‘)* and inches *(“)* shall not be permitted on water depth signs.

4.5.19.2.4.2 Metric

Metric units may be provided in addition to—but not in lieu of—units of feet and inches.

4.5.19.3 Tolerance

Depth markers shall be located to indicate water depth to the nearest three inches *(7.6 cm)*, as measured from the POOL floor three feet *(0.9 m)* out from the POOL wall to the gutter lip, mid-point of surface SKIMMER*(s)*, or surge weir*(s)*.

4.5.19.4 No Diving Markers

4.5.19.4.1[A] Depths

For POOL water depths 5 feet *(1.5 m)* or shallower, all DECK depth markers required by MAHC 4.5.19 shall be provided with "NO DIVING" warning signs along with the universal international symbol for "NO DIVING"

4.5.19.4.1.1 Spacing

"NO DIVING" warning signs and symbols shall be spaced at no more than 25 foot *(7.6 m)* intervals around the POOL perimeter edge.

4.5.19.4.2 Durable

"NO DIVING" MARKERS shall be constructed of a durable material resistant to local weather conditions.

4.5.19.4.3 Slip Resistant

"NO DIVING" MARKERS shall be slip-resistant when they are located on horizontal surfaces.

4.5.19.4.4 At Least Four Inches

All lettering and symbols shall be at least four inches *(10.2 cm)* in height.

4.5.19.5[A] Depth Marking At Break in Floor Slope

4.5.19.5.1 Over Five Feet

For POOLS deeper than five feet *(1.5 m)*, a line of contrasting color, not less than two inches *(5.1 cm)* and not more than six inches *(15.2 cm)* in width, shall be clearly and permanently installed on the POOL floor at the shallow side of the break in the floor slope, and extend up the POOL walls to the waterline.

4.5.19.5.2 Durable

Depth marking at break in floor slope shall be constructed of a durable material resistant to local weather conditions and be slip resistant.

4.5.19.5.3 Safety Rope

One foot *(30.5 cm)* to the shallow water side of the break in floor slope and contrasting band, a SAFETY float rope shall extend across the POOL surface with the exception of WAVE POOLS, SURF POOLS, and WATERSLIDE LANDING POOLS.

4.5.19.6[A] Dual Marking System

Symmetrical AQUATIC VENUE designs with the deep point at the center may be allowed by providing a dual depth marking system which indicates the depth at the wall as measured in MAHC 4.5.19.3 and at the deep point.

4.5.19.7 Non-Traditional Aquatic Venues

Controlled-access AQUATIC VENUES *(such as ACTIVITY POOLS, LAZY RIVERS, and other AQUATIC VENUES with limited access)* shall only require depth markers on a sign at points of entry.

4.5.19.7.1 Clearly Visible

Depth marker signs shall be clearly visible to PATRONS entering the venue.

4.5.19.7.2 Lettering and Symbols

All lettering and symbols shall be as required for other types of depth markers.

4.5.19.8[A] Wading Pool Depth Markers

AQUATIC VENUES where the maximum water depth is six inches *(15.2 cm)* of water or less *(such as WADING POOLS and ACTIVITY POOL areas)* shall not be required to have depth markings or "NO DIVING" signage.

4.5.19.9 Movable Floor Depth Markers

For AQUATIC VENUES with movable floors, a sign indicating movable floor and/or varied water depth shall be provided and clearly visible from the DECK.

4.5.19.9.1 Vertical Measurement

The posted water depth shall be the water level to the floor of the AQUATIC VENUE according to a vertical measurement taken three feet *(0.9 m)* from the AQUATIC VENUE wall.

4.5.19.9.2 Signage

A sign shall be posted to inform the public that the AQUATIC VENUE has a varied depth and refer to the sign showing the current depth.

4.5.19.10 Spas

A minimum of two depth markers shall be provided regardless of the shape or size of the SPA as per MAHC 4.12.1.6.

4.5.20 Aquatic Venue Shell Maintenance [N/A]

4.5.21[A] Special Use Aquatic Venues

4.5.21.1 Adequately Support

The design professional shall provide information to adequately support why the SPECIAL USE AQUATIC VENUE does not meet the definition and use characteristics of other categories of AQUATIC VENUES or POOLS listed in the CODE.

4.5.21.2 Justification

The design professional shall provide justification for design parameters that do not meet the design STANDARDS and construction requirements listed in MAHC 4.0.

4.6 Indoor / Outdoor Environment

4.6.1 Lighting

4.6.1.1 General Requirements

4.6.1.1.1 Outdoor Aquatic Venues

Lighting as described in this subsection shall be provided for all outdoor AQUATIC VENUES open for use from 30 minutes before sunset to 30 minutes after sunrise, or during periods of natural illumination below the levels required in MAHC 4.6.1.3.1.

4.6.1.1.2 Accessible

No lighting controls shall be accessible to PATRONS or BATHERS.

4.6.1.2[A] Windows / Natural Light

Where natural lighting methods are used to meet the light level requirements of MAHC 4.6.1.3 during portions of the day when adequate natural lighting is available, one of the following methods shall be used to ensure that lights are turned on when natural lighting no longer meets these requirements:

1) Automatic lighting controls based on light levels or time of day, or
2) Written operations procedures where manual controls are used.

4.6.1.3[A] Light Levels

POOL water surface and DECK light levels shall meet the following minimum maintained light levels:

1) Indoor Water Surface: 30 horizontal footcandles *(323 lux)*
2) Outdoor Water Surface: 10 horizontal footcandles *(108 lux)*
3) Deck: 10 horizontal footcandles *(108 lux).*

Note: Higher levels may be advisable for acceptable spectator viewing for competitive swimming and diving events.

4.6.1.4[A] Overhead Lighting

4.6.1.4.1[A] Artificial Lighting

Artificial lighting shall be provided at all AQUATIC VENUES which are to be used at night or which do not have adequate natural lighting.

4.6.1.4.2 Aquatic Venue Floor

Lighting shall illuminate all parts of the floor of the AQUATIC VENUE to enable a QUALIFIED LIFEGUARD or other person to determine whether a BATHER is on the floor of the AQUATIC VENUE.

4.6.1.4.3 Aquatic Venue Illumination

Lighting shall illuminate all parts of the AQUATIC VENUE including the water, the depth markers, signs, entrances, restrooms, SAFETY equipment, and the required DECK area and walkways.

4.6.1.5[A] Underwater Lighting

4.6.1.5.1[A] Minimum Requirements

Underwater lighting, where provided, shall be not less than eight initial rated lumens per square foot of POOL water surface area.

4.6.1.5.1.1 Location

Such underwater lights, in conjunction with overhead or equivalent DECK lighting, shall be located to provide illumination so that all portions of the AQUATIC VENUE, including the AQUATIC VENUE bottom and drain*(s)*, may be readily seen.

4.6.1.5.1.2 Higher Light Levels

Higher underwater light levels shall be considered for deeper water to achieve this outcome.

4.6.1.5.2 Dimmable Lighting

Dimmable lighting shall not be used for underwater lighting.

4.6.1.6[A] Night Swimming with No Underwater Lighting

4.6.1.6.1 Minimum Requirements

Where outdoor POOLS are open for use from 30 minutes before sunset to 30 minutes after sunrise, or during periods of low illumination, underwater lighting may be excluded where:

1) Maintained POOL surface lighting levels are a minimum of 15 horizontal footcandles *(161 lux),* and
2) All portions of the POOL, including the bottom and drain*(s)*, are readily visible as required in MAHC 5.7.6.1.

4.6.1.7[A] Emergency Lighting

4.6.1.7.1 Emergency Egress Lighting

POOL areas requiring lighting shall be provided with emergency egress lighting in compliance with the applicable building CODES.

4.6.1.7.2 Footcandles

The path of egress shall be illuminated to at least a value of 0.5 footcandles *(5.4 lux)*.

4.6.1.8[A] Glare

Windows and any other features providing natural light into the POOL space and overhead or equivalent DECK lighting shall be designed or arranged to inhibit or reduce glare on the POOL water surface that would prevent seeing objects on the POOL bottom.

4.6.2[A] Indoor Aquatic Facility Ventilation

4.6.2.1[A] Purpose

INDOOR AQUATIC FACILITY AIR HANDLING SYSTEMS shall be designed, constructed, and installed to support the health and SAFETY of the building's PATRONS.

4.6.2.2[A] Exemptions

INDOOR AQUATIC FACILITY AIR HANDLING SYSTEM design requirements do not apply to AQUATIC FACILITIES that do not meet the definition of a "Building" in the IBC 2012.

4.6.2.3 Indoor Aquatic Facility

AIR HANDLING SYSTEM design requirements shall apply to new or SUBSTANTIALLY ALTERED INDOOR AQUATIC FACILITIES including the area of the building's AQUATIC VENUES and the surrounding BATHER and spectator/STADIUM SEATING areas.

4.6.2.4 Mechanical Code

INDOOR AQUATIC FACILITY AIR HANDLING SYSTEM design, construction, and installation shall comply with applicable local CODES.

4.6.2.5[A] ASHRAE 62.1 Compliance

INDOOR AQUATIC FACILITY AIR HANDLING SYSTEM design, construction, and installation shall comply with ASHRAE Standard 62.1 2013, *Ventilation for Acceptable Indoor Air Quality*, and/or applicable local CODES with additional requirements as stated in MAHC 4.6.2.6.

4.6.2.6 Air Handling System Design

4.6.2.6.1 Mechanical Systems

Ventilation shall be provided through mechanical systems and/or engineered openings for natural ventilation.

4.6.2.6.2[A] Design Factors and Performance Requirements

The AIR HANDLING SYSTEM design engineer shall provide plan drawings and documentation with the following components showing the design meets the performance requirements per MAHC 4.6.2.7:

1) Building layout identifying the location of the INDOOR AQUATIC FACILITY;
2) INDOOR AQUATIC FACILITY size including area in square feet and volume in cubic feet;
3) The area in square feet for DECK and for STADIUM SEATING sections;
4) Theoretical peak occupancy per aquatic venue and deck spaces;

5) Placement of AIR HANDLING SYSTEM and other building outdoor air intakes exterior to the building;
6) Placement of AIR HANDLING SYSTEM and other building exhaust vents exterior to the building;
7) Placement of return air intakes within the INDOOR AQUATIC FACILITY;
8) Placement of supply air locations within the INDOOR AQUATIC FACILITY;
9) Identify system capabilities, if utilized, to automatically or manually modulate the amount of outdoor air for the purposes of reducing the number of *c*fm of outdoor air when occupancy is lower than THEORETICAL PEAK OCCUPANCY; and
10) Identify system design to maintain negative air pressure in the INDOOR AQUATIC FACILITY relative to the indoor areas external to it.

4.6.2.6.3[A] Other Air Handling Systems

AIR HANDLING SYSTEM design for CHEMICAL STORAGE SPACES, mechanical, toilet, SHOWER, and dressing rooms are not included in the scope of this section of the CODE, but shall be considered for their effects on the performance requirements of MAHC 4.6.2.7 such as maintaining negative pressure, temperature differences, and contribution to the air volume of the INDOOR AQUATIC FACILITY.

4.6.2.6.4 High Volume, Low Speed Fans

AIR HANDLING SYSTEM design may not consider mechanical fans used to push air within the space as part of the outdoor air calculations for the INDOOR AQUATIC FACILITY as defined in MAHC 4.6.2.7.

4.6.2.6.4.1 Air Delivery Rate

Mechanical fans used to push air within the space may be used in the calculation for air delivery rate (TURNOVER).

4.6.2.6.5 Occupied and Open All Seasons

AIR HANDLING SYSTEM design may include natural ventilation calculated in accordance with the ASHRAE Handbooks to substitute the corresponding portion of mechanical ventilation only if all the calculated exterior openings will be continuously controlled open during all times the INDOOR AQUATIC FACILITY is occupied, regardless of season.

4.6.2.6.6 Air Distribution Design

The design of the distribution of supply air and distribution of exhaust or return air shall consider obstacles such as support columns, architectural structures, and AQUATIC FEATURES.

4.6.2.7 Performance Requirements for Air Handling Systems

4.6.2.7.1[A] Minimum Outdoor Air Requirements

The AIR HANDLING SYSTEM shall have a design capability to supply the minimum outdoor air requirements using ASHRAE Standard 62.1 2013, *Ventilation for Acceptable Indoor Air Quality*.

4.6.2.7.2[A] System Alarm

The AIR HANDLING SYSTEM design shall provide system features to notify the operator if the outdoor air flow rate entering the INDOOR AQUATIC FACILITY is below 0.48 cfm/ft^2 *(1.8 m^3/h).*

4.6.2.7.3 Real-Time Occupancy

Design of the AIR HANDLING SYSTEM shall meet the requirements for the number of cfm/ft^2 based on the THEORETICAL PEAK OCCUPANCY.

4.6.2.7.3.1 Method to Determine

If a method to determine real-time actual occupancy is available, then the system may modulate to reduce outdoor air cfm to meet the requirement for the actual occupancy for the associated time frame.

4.6.2.7.4 Air Delivery Rate

The AIR HANDLING SYSTEM shall supply an air delivery rate as defined in ASHRAE Handbook – HVAC Applications 2011, *Places of Assembly, Natatoriums*.

4.6.2.7.5 Consistent Air Flow

INDOOR AQUATIC FACILITY AIR HANDLING SYSTEM shall be designed to provide consistent air flow through all parts of the INDOOR AQUATIC FACILITY to preclude any stagnant areas.

4.6.2.7.6[A] Relative Humidity

The AIR HANDLING SYSTEM shall maintain the relative humidity in the space as defined in *ASHRAE Handbook: HVAC Applications, 2011, Places of Assembly, Natatoriums*.

4.6.2.7.6.1 Dew Point

The AIR HANDLING SYSTEM shall be designed to maintain the dew point of the INTERIOR SPACE less than the dew point of the interior walls at all times so as to prevent damage to structural members and to prevent biological growth on walls.

4.6.2.7.6.2 Condensation & Mold Control

The AIR HANDLING SYSTEM shall be designed to achieve several objectives including

- Maintaining space conditions,
- Delivering the outside air to the breathing area, and
- Flushing the outside walls and windows, which can have the lowest surface temperature and therefore the greatest chance for condensation.

4.6.2.7.7 Negative Air Pressure

AIR HANDLING SYSTEM air flow shall be designed to maintain negative air pressure in the INDOOR AQUATIC FACILITY relative to the areas external to it *(such as adjacent indoor spaces and outdoor ambient space)*.

4.6.2.7.8[A] Disinfection By-Product Removal

Sufficient return air intakes shall be placed near AQUATIC VENUE surfaces such that they remove the highest concentration of airborne DBP contaminated air.

4.6.2.7.8.1 Airflow Across Water Surface

The AIR HANDLING SYSTEM shall be designed considering airflow across the water surface to promote removal of DBPs.

4.6.2.7.9 Re-Entrainment of Exhaust

AIR HANDLING SYSTEM outdoor air intakes shall be placed to minimize RE-ENTRAINMENT of exhaust air from building systems back into the facility.

4.6.2.7.9.1 System Exhaust

AIR HANDLING SYSTEM exhaust from CHEMICAL STORAGE SPACES, mechanical, toilet, SHOWER, and dressing rooms shall not be directed into the AQUATIC FACILITY.

4.6.2.7.10 Access Control

The AIR HANDLING SYSTEM shall be designed to provide a means to limit physical or electronic access to system control to the operator and anyone the operator deems to have access.

4.6.2.7.11[A] Purge

The AIR HANDLING SYSTEM shall have the capability to periodically PURGE air for air quality maintenance or for emergency situations.

4.6.2.7.11.1 Purge Capacity

The AIR HANDLING SYSTEM shall have a PURGE capacity equal or greater than two times the ASHRAE Standard 62.1 2013 level.

4.6.2.7.11.1.1 Manual Activation

This PURGE shall be capable of being manually activated.

4.6.2.7.11.2 Outdoor Air

Outdoor air required for PURGE shall not be required to be heated or otherwise treated.

4.6.2.7.12[A] Air Handling System Filters

The AIR HANDLING SYSTEM design shall include filters for outdoor air and recirculated air with a MERV rating of eight.

4.6.2.8 Air Handling System Installation

4.6.2.8.1 Air Handling System Procedures

The contractor installing the INDOOR AQUATIC FACILITY AIR HANDLING SYSTEM shall provide the AQUATIC FACILITY owner with an operating manual from the manufacturer which includes:

1) Startup and shutdown procedures;
2) PURGING and other SAFETY procedures;
3) Cleaning procedures;
4) General maintenance requirements with parts listings and frequency of maintenance *(i.e., filter cleaning frequencies, motor bearing maintenance)*;
5) Pressure differential specifications for filter replacement, filter replacement type, and frequency of cleaning or replacement;
6) Troubleshooting processes;
7) Frequency of required calibration of equipment;
8) Descriptions of general operating schemes; and
9) Contact information for the manufacturer.

4.6.2.9 Air Handling System Commissioning

4.6.2.9.1 System Commissioning

A qualified, licensed professional shall commission the AIR HANDLING SYSTEM to verify that the installed system is operating properly in accordance with the system design.

4.6.2.9.2 Written Statement

A written statement of commissioning shall be provided to the AQUATIC FACILITY owner including but not limited to:

1) The number of cfm of outdoor air flowing into the INDOOR AQUATIC FACILITY at the time of commissioning;
2) The number of cfm of exhaust air flowing through the system at the time of commissioning; and,
3) A statement that the amount of outdoor air meets the performance requirements of MAHC 4.6.2.7.

4.6.3 Indoor/Outdoor Aquatic Facility Electrical Systems and Components

4.6.3.1[A] General Guidelines

4.6.3.1.1 NEC Requirements

Electrical wiring and systems shall comply with the requirements of the NEC.

4.6.3.1.1.1 Providing Relief

Nothing in this CODE shall be construed as providing relief from any applicable requirements of the NEC or other applicable CODE.

4.6.3.1.2[A] Indoor Aquatic Facilities

An INDOOR AQUATIC FACILITY shall be considered a wet and CORROSIVE environment.

4.6.3.2[A] Electrical Equipment in Interior Chemical Storage Spaces

4.6.3.2.1[A] Wet and Corrosive

CHEMICAL STORAGE SPACES shall be considered wet and CORROSIVE environments.

4.6.3.2.2[A] Electrical Conduit

Electrical conduit shall not enter or pass through an interior CHEMICAL STORAGE SPACE, except as required to service devices integral to the function of the room, such as pumps, vessels, controls, lighting and SAFETY devices or, if allowed by the NEC.

4.6.3.2.2.1 Sealed and Inert

Where required, the electrical conduit in an interior CHEMICAL STORAGE SPACE shall be sealed and made of materials that will not interact with any chemicals in the CHEMICAL STORAGE SPACE.

4.6.3.2.3[A] Electrical Devices

Electrical devices or equipment shall not occupy an interior CHEMICAL STORAGE SPACE, except as required to service devices integral to the function of the room, such as pumps, vessels, controls, lighting and SAFETY devices.

4.6.3.2.4[A] Protected Against Breakage

Lamps, including fluorescent tubes, installed in interior CHEMICAL STORAGE SPACES shall be protected against breakage with a lens or other cover, or be otherwise protected against the accidental release of hot materials.

4.6.4[A] Pool Water Heating

4.6.4.1[A] High Temperature

When designing POOL heating equipment, measures shall be taken to prevent BATHER exposure to water temperatures in excess of 104°F *(40°C)*.

4.6.4.2 Pressure Relief Device

Where POOL water heating equipment is installed with valves capable of isolating the heating equipment from the POOL, a listed pressure-relief device shall be installed to limit the pressure on the heating equipment to no more than the maximum value specified by the heating-equipment manufacturer and applicable CODES.

4.6.4.3 Code Compliance

POOL-water heating equipment shall be selected and installed to preserve compliance with the applicable CODES, the terms of listing and labeling of equipment, and with the equipment manufacturer's installation instructions and applicable CODES.

4.6.4.4[A] Equipment Room Requirements

Where POOL water heaters use COMBUSTION and are located inside a building, the space in which the heater is located shall be considered to be an EQUIPMENT ROOM, and the requirements of MAHC 4.9.1 shall apply.

4.6.4.4.1 Carbon Monoxide Detector

A carbon monoxide detector with local alarming, listed and labeled in accordance with UL 2075, shall be installed in all such EQUIPMENT ROOMS.

4.6.4.4.2 Adjacent Rooms

All rooms that are immediately adjacent to spaces containing fuel burning equipment or vents carrying the products of combustion shall also be provided with locally alarming carbon monoxide detectors.

4.6.4.5 Exception

Heaters listed and labeled for the atmosphere shall be acceptable without isolation from chemical fumes and vapors.

4.6.5 First Aid Area

4.6.5.1[A] Station Design

Design and construction of new AQUATIC FACILITIES shall include an area designated for first aid equipment and/or treatment.

4.6.6 Emergency Exit

4.6.6.1 Labeling

Gates and/or doors which will allow egress without a key shall be clearly and conspicuously labeled in letters at least four inches *(10.2 cm)* high "EMERGENCY EXIT."

4.6.7 Drinking Fountains

4.6.7.1[A] Provided

A drinking fountain shall be provided inside an AQUATIC FACILITY.

4.6.7.1.1 Alternative

Alternate locations or the use of bottled water shall be evaluated by the AHJ.

4.6.7.1.2 Common Use Area

If the drinking fountain cannot be provided inside the AQUATIC FACILITY, it shall be provided in a common use building or area adjacent to the AQUATIC FACILITY entrance and on the normal path of BATHERS going to the AQUATIC FACILITY entrance.

4.6.7.2 Readily Accessible

The drinking fountain shall be located where it is readily accessible and not a hazard to BATHERS per MAHC 4.10.2.

4.6.7.2.1 Not Located

The drinking fountain shall not be located in a SHOWER area or toilet area.

4.6.7.3 Single Fountain

A single drinking fountain shall be allowed for one or more AQUATIC VENUES within an AQUATIC FACILITY.

4.6.7.4 Angle Jet Type

The drinking fountain shall be an angle jet type installed according to applicable plumbing CODES.

4.6.7.5 Potable Water Supply

The drinking fountain shall be supplied with water from an approved potable water supply.

4.6.7.6 Wastewater

The wastewater discharged from a drinking fountain shall be routed to an approved sanitary sewer system or other approved disposal area according to applicable plumbing CODES.

4.6.8 Garbage Receptacles

4.6.8.1 Sufficient Number

A sufficient number of receptacles shall be provided within an AQUATIC FACILITY to ensure that garbage and refuse can be disposed of properly to maintain safe and sanitary conditions.

4.6.8.2 Number and Location

The number and location of receptacles shall be at the discretion of the AQUATIC FACILITY manager.

4.6.8.3 Closable

Receptacles shall be designed to be closed with a lid or other cover so they remain closed until intentionally opened.

4.6.9 Food and Drink Concessions

4.6.9.1 Meet AHJ Requirements

Concessions for food and drink in an AQUATIC FACILITY shall meet all AHJ requirements.

4.6.10 Spectator Areas

4.6.10.1 Within Aquatic Facility Enclosure

An area designed for use by spectators may be located within an AQUATIC FACILITY ENCLOSURE.

4.6.10.2 Deck

When a spectator area or an access to a spectator area is located within the AQUATIC FACILITY ENCLOSURE, the DECK adjacent to the area or access shall provide egress width for the spectators in addition to the width required by MAHC 4.8.1.5.

4.6.10.2.1[A] Additional Width

The additional width shall be based on the egress requirements in the applicable building CODE based on the THEORETICAL PEAK OCCUPANCY of the AQUATIC FACILITY served with a minimum width of four feet *(1.2 m)* and have either of the following qualities outlined in MAHC 4.6.10.2.1.1.

4.6.10.2.1.1 Barrier

A BARRIER as defined in MAHC 4.8.6.1 located on the DECK to separate the DECK used by spectators from the PERIMETER DECK used by BATHERS may have one or more openings directly into the BATHER areas with a demarcation line on the DECK that shows the separation between the DECK used by spectators and the PERIMETER DECK used by BATHERS.

4.6.10.3[A] Balcony

A spectator or other area located in a balcony within ten feet *(3.0 m)* of or overhanging any portion of an AQUATIC VENUE shall be designed to deter jumping or diving into the AQUATIC VENUE.

4.6.10.4[A] Bleachers

Bleachers in a spectator area shall be designed according to the ICC's most recent version of the 300 Standard or another applicable CODE.

4.7 Recirculation and Water Treatment

4.7.1 Recirculation Systems and Equipment

4.7.1.1[A] General

4.7.1.1.1 Equipped and Operated

All AQUATIC FACILITIES shall be equipped and operated with a recirculation and filtration system capable of meeting the provisions outlined in MAHC 4.7.

4.7.1.1.2 Component Installation

The installation of the recirculation and the filtration system components shall be performed in accordance with the designer's and manufacturer's instructions.

4.7.1.1.3 Recirculation System

A water RECIRCULATION SYSTEM consisting of one or more pumps, pipes, return INLETS, suction outlets, tanks, filters, and other necessary equipment shall be provided.

4.7.1.2[A] Combined Aquatic Venue Treatment

4.7.1.2.1 Maintain and Measure

When treatment systems of multiple AQUATIC VENUES are combined, the design shall include all appurtenances to maintain and measure the required water characteristics including but not limited to flow rate, pH, and disinfectant concentration in each AQUATIC VENUE or AQUATIC FEATURE.

4.7.1.2.2 Secondary Disinfection

If SECONDARY DISINFECTION is required for an INCREASED RISK AQUATIC VENUE as per MAHC 4.7.3.3.1.2, then SECONDARY DISINFECTION shall be required for all treatment systems that are combined with the INCREASED RISK AQUATIC VENUE.

4.7.1.2.3 Isolate

When multiple AQUATIC VENUES are combined in one treatment system, each AQUATIC VENUE shall be capable of being isolated for maintenance purposes.

4.7.1.3 Inlets

4.7.1.3.1[A] General

4.7.1.3.1.1 Hydraulically Balanced

The RECIRCULATION SYSTEM shall be designed with sufficient flexibility to achieve a hydraulic apportionment that will ensure the following:

1) Effective distribution of treated water, and
2) Maintenance of a uniform DISINFECTANT residual and pH throughout the AQUATIC VENUE.

4.7.1.3.1.1.1 Alternative Design Justification

Alternative designs shall be allowed based on adequate engineering justification.

4.7.1.3.1.2 Inlets

Effective distribution of treated water shall be accomplished by either a continuous POS with integral INLETS or by means of directionally adjustable INLETS adequate in design, number, and location.

4.7.1.3.1.3 Adequate Mixing

POOLS shall use wall and/or floor INLETS to provide adequate mixing.

4.7.1.3.1.3.1 Greater Than Fifty Feet Wide

For POOLS greater than 50 feet wide *(15.2 m)*, floor INLETS shall be required.

4.7.1.3.1.4 Other Inlet Types

All other types of INLET systems not covered in this section shall be subject to approval by the AHJ with proper engineering justification.

4.7.1.3.1.5 Hydraulically Sized

INLETS shall be hydraulically sized to provide the design flow rates for each POOL area of multi-zone POOLS based on the required design TURNOVER RATE for each zone.

4.7.1.3.2[A] Floor Inlets

4.7.1.3.2.1 Uniformly Spaced

Floor INLETS shall be spaced to effectively distribute the treated water throughout the POOL.

4.7.1.3.2.2 Flush with Bottom

Floor INLETS shall be flush with the bottom of the POOL.

4.7.1.3.2.2.1 Distance

Distance between floor INLETS shall be no greater than 20 feet *(6.1 m)*.

4.7.1.3.2.2.2 Row

A row of floor INLETS shall be located within 15 feet *(4.6 m)* of each side wall.

4.7.1.3.2.3 Spaced

Floor INLETS, used in combination with wall INLETS, shall be spaced no greater than 25 feet *(7.6 m)* from nearest side walls.

4.7.1.3.3 Wall Inlets

4.7.1.3.3.1[A] Effective Mixing

Wall INLET velocity shall mix the water effectively.

4.7.1.3.3.2 Adjustable

INLETS shall be directionally adjustable to provide effective distribution of water.

4.7.1.3.3.3[A] Inlet Spacing

Wall INLETS shall be spaced no greater than 20 feet *(6.1 m)* apart.

4.7.1.3.3.3.1 Corner

INLETS shall be placed within five feet *(1.5 m)* of each corner of the POOL.

4.7.1.3.3.3.2 Skimmers

INLETS shall be placed at least five feet *(1.5 m)* from a SKIMMER.

4.7.1.3.3.3.3 Isolated

INLETS shall be placed in each recessed or isolated area of the POOL.

4.7.1.3.3.4 Directional Flow

Wall INLETS shall not require design to provide directional flow if part of a manufactured gutter system in which the filtered return water conduit is contained within the gutter structure.

4.7.1.3.3.5[A] Dye Testing

The AHJ may require dye testing may be required by to evaluate the mixing characteristics of the RECIRCULATION SYSTEM.

4.7.1.3.3.5.1 Failed Test

If dye test reveals inadequate mixing in the POOL after 20 minutes, the RECIRCULATION SYSTEM shall be adjusted or modified to assure adequate mixing.

4.7.1.4 Perimeter Overflow Systems/Gutters

4.7.1.4.1 General

4.7.1.4.1.1[A] Skimming

All POOLS shall be designed to provide SKIMMING for the entire POOL surface area with engineering rationale provided by the design professional.

4.7.1.4.1.1.1 Around Entire Pool

For POOLS that require a POS, the POS shall extend around the entire POOL perimeter except where noted in this CODE.

4.7.1.4.1.2 Zero Depth Entry

ZERO DEPTH ENTRY POOLS shall have a continuous overflow trench that terminates as close to the side walls as practical including any zero-depth portion of the POOL perimeter.

4.7.1.4.1.2.1 Ends

Where a POS cannot be continuous, the ends of each section shall terminate as close as practical to each other.

4.7.1.4.2[A] Perimeter Overflow System Size and Shape

4.7.1.4.2.1 Continuous Water Removal

The gutter system shall be designed to allow continuous removal of water from the POOL'S upper surface at a rate of at least 125 percent of the approved total recirculation flow rate chosen by the designer.

4.7.1.4.2.2 Inspection

Gutters shall permit ready inspection, cleaning, and repair.

4.7.1.4.3[A] Gutter Outlets

Drop boxes, converters, return piping, or FLUMES used to convey water from the gutter shall be designed to:

- Prevent flooding and BACKFLOW of skimmed water into the POOL, and
- Handle at least 125 percent of the approved total recirculation flow.

4.7.1.4.4 Surge Tank Capacity

4.7.1.4.4.1[A] Net Surge Capacity

All POSs shall be designed with an effective net surge capacity of not less than one gallon for each square foot *(40.7 L/m^2)* of POOL surface area.

4.7.1.4.4.1.1 Surge Components

Surge shall be provided within a surge tank, or the gutter or filter above the normal operating level, or elsewhere in the system.

4.7.1.4.4.2 Tank Capacity

The tank capacity specified shall be the net capacity.

4.7.1.4.4.3 Tank Levels

The design professional shall define the minimum, maximum, and normal POOL operating water levels in the surge tank.

4.7.1.4.4.3.1 Marked

The surge tank's minimum, maximum, and normal POOL operating water levels shall be marked on the tank so as to be readily visible for inspection.

4.7.1.4.4.4 Overflow Pipes

Surge tanks, shall have overflow pipes to convey excess water to waste via an air gap or other approved BACKFLOW prevention device.

4.7.1.4.5[A] Tolerances

Gutters shall be level within a tolerance of plus or minus $^{1}/_{16}$ inch *(1.6 mm)* around the perimeter of the AQUATIC VENUE.

4.7.1.4.6[A] Makeup Water System

4.7.1.4.6.1 Automatic Makeup

Automatic makeup water supply equipment shall be provided to maintain continuous skimming of POOLS with POSs.

4.7.1.4.6.2 Air Gap

Makeup water shall be supplied through an air gap or other approved BACKFLOW prevention device.

4.7.1.5 Skimmers and Alternative Gutter Technologies Using In-Pool Surge Capacity

4.7.1.5.1 General

4.7.1.5.1.1 Manufactured

The use of manufactured direct suction SKIMMERS shall be in accordance with the manufacturer's recommendations.

4.7.1.5.1.2[A] Provided

Where SKIMMERS are used, at least one surface SKIMMER shall be provided for each 500 square feet *(46 m^2)* of surface area or fraction thereof.

4.7.1.5.1.2.1 Conditions

Additional SKIMMERS may be required to achieve effective skimming under site-specific conditions *(e.g., heavy winds and/or CONTAMINANT loading)* and/or to comply with all applicable building CODES.

4.7.1.5.1.3[A] Hybrid Systems

Hybrid systems that incorporate surge weirs in the overflow gutters to provide for in-POOL surge shall meet all of the requirements specified for overflow gutters *(with the exception of the surge or balance tank, since the surge capacity requirement will be alternately met by the in-POOL surge capacity)*.

4.7.1.5.1.3.1[A] Surge Weirs

The number of surge weirs shall be based on the individual surge weir capacity and the operational apportionment of the design recirculation flow rate.

4.7.1.5.1.3.1.1 Locations

The location of the required number of surge weirs shall be uniformly spaced in the gutter sections.

4.7.1.5.1.4[A] Design Capacity

When used, the SKIMMER SYSTEM shall be designed to handle up to 100% of the total recirculation flow rate chosen by the designer.

4.7.1.5.1.5 Pool Width Limitations

POOLS using SKIMMERS shall not exceed 30 feet *(9.1 m)* in width.

4.7.1.5.2 Skimmer Location

4.7.1.5.2.1 Effective

SKIMMERS shall be so located as to provide effective skimming of the entire water surface.

4.7.1.5.2.2 Steps and Recessed Areas

SKIMMERS shall be located so as not to be affected by restricted flow in areas such as near steps and within small recesses.

4.7.1.5.2.3 Wind Direction

Wind direction shall be considered in number and placement of SKIMMERS.

4.7.1.5.3[A] Skimmer Flow Rate

The flow rate for the SKIMMERS shall comply with manufacturer data plates or NSF/ANSI 50 including Annex K.

4.7.1.5.4 Control

4.7.1.5.4.1 Weir

Each SKIMMER shall have a weir that adjusts automatically to variations in water level over a minimum range of four inches *(10.2 cm)*.

4.7.1.5.4.2 Trimmer Valve

Each SKIMMER shall be equipped with a trimmer valve capable of distributing the total flow between individual SKIMMERS.

4.7.1.5.5 Tolerances

4.7.1.5.5.1 Skimmer Base

The base of each SKIMMER shall be level with all other SKIMMERS in the POOL within a tolerance of plus or minus ¼ inch *(6.4 mm)*.

4.7.1.6[A] Submerged Suction Outlet

4.7.1.6.1 General

Submerged suction outlets, including sumps and covers, shall be listed and labeled to the requirements of ANSI/APSP-16 2011.

4.7.1.6.2 Number and Spacing

4.7.1.6.2.1 Hydraulically Balanced

A minimum of two hydraulically balanced filtration system outlets are required in the bottom.

4.7.1.6.2.1.1 Located on the Bottom

One of the outlets may be located on the bottom of a side/end wall at the deepest level.

4.7.1.6.2.1.2 Connected

The outlets shall be connected to a single main suction pipe by branch lines piped to provide hydraulic balance between the drains.

4.7.1.6.2.1.3 Valved

The branch lines shall not be valved so as to be capable of operating independently.

4.7.1.6.2.2 Spaced

Outlets shall be equally spaced from the POOL side walls.

4.7.1.6.2.3 Located

Outlets shall be located no less than three feet *(0.9 m)* apart, measuring between the centerlines of the suction outlet covers.

4.7.1.6.3 Tank Connection

Where gravity outlets are used, the main drain outlet shall be connected to a surge tank, collection tank, or balance tank/pipe.

4.7.1.6.4[A] Flow Distribution and Control

4.7.1.6.4.1 Design Capacity

The main drain system shall be designed at a minimum to handle recirculation flow of 100% of total design recirculation flow rate.

4.7.1.6.4.1.1 Two Main Drain Outlets

Where there are two main drain outlets, the branch pipe from each main drain outlet shall be designed to carry 100% of the recirculation flow rate.

4.7.1.6.4.1.2 Three or More Drains

Where three or more main drain outlets are connected by branch piping in accordance with MAHC 4.7.1.6.2.1.1 through MAHC 4.7.1.6.2.1.3, the design flow through each branch pipe from each main drain outlet may be as follows:

1) Q_{max} for each drain= Q*(total recirculation rate)* / *(number of drains less one)*, and
2) $Q_{max}=Q_{total}$ / *(N-1)*.

4.7.1.6.4.2 Proportioning Valve

The single main drain suction pipe to the pump shall be equipped with a proportioning valve*(s)* to adjust the flow distribution between the main drain piping and the surface overflow system piping.

4.7.1.6.5 Flow Velocities

4.7.1.6.5.1 Standards

Flow velocities shall meet ANSI/APSP-16 2011 based on 100% design flow through each main drain cover.

4.7.1.7 Piping

4.7.1.7.1 Design

4.7.1.7.1.1 Materials

Piping system components in contact with swimming POOL water shall be of non-toxic material, resistant to corrosion, able to withstand operating pressures, chemicals, and temperatures.

4.7.1.7.1.2 Standards

Piping and piping system component materials shall be suitable for potable water contact.

4.7.1.7.1.2.1 Listed and Labeled

Piping and piping system component materials shall be listed and labeled to NSF/ANSI Standard 14, NSF/ANSI Standard 50, and NSF/ANSI Standard 61, as applicable.

4.7.1.7.1.2.2 Certified

Piping and piping system component materials shall be listed and labeled to a specific STANDARD by an ANSI-accredited certification organization.

4.7.1.7.2 Velocity in Pipes

4.7.1.7.2.1[A] Discharge Piping

RECIRCULATION SYSTEM piping shall be designed so that water velocities do not exceed eight feet *(2.4 m)* per second on the discharge side of the recirculation pump unless alternative values have proper engineering justification.

4.7.1.7.2.2[A] Suction Piping

Suction piping shall be sized so that the water velocity does not exceed six feet per second *(1.8 m/s)* unless alternative values have proper engineering justification.

4.7.1.7.2.3[A] Additional Considerations

Gravity piping shall be sized with consideration of available system head or as demonstrated by detailed hydraulic calculations at the design recirculation flow rate.

4.7.1.7.3[A] Drainage and Installation

4.7.1.7.3.1 Temperature Variations

Provisions shall be made for expansion and contraction of pipes due to temperature variations.

4.7.1.7.3.2 Drainage

Provisions shall be made for complete drainage of all AQUATIC VENUE piping.

4.7.1.7.3.3 Supported

All piping shall be supported continuously or at sufficiently close intervals to prevent sagging and settlement.

4.7.1.7.4 Piping and Component Identification

4.7.1.7.4.1[A] Clearly Marked

All exposed piping shall be clearly marked to indicate function.

4.7.1.7.4.2 Flow Direction and Source

All piping shall be clearly marked to indicate type or source of water and direction of flow with clear labeling and/or color coding.

4.7.1.7.4.3 Valves

All valves shall be clearly marked to indicate function with clear labeling and/or color coding.

4.7.1.7.4.4 Schematic Displayed

A complete, easily readable schematic of the entire AQUATIC VENUE RECIRCULATION SYSTEM shall be openly displayed in the mechanical room or available to maintenance and inspection personnel.

4.7.1.7.5 Testing

4.7.1.7.5.1 Static Water Pressure Test

Suction and supply POOL piping shall be subjected to a static hydraulic water pressure test for the duration specified by the design engineer and/or AHJ.

4.7.1.7.5.2 Greater

Suction and supply AQUATIC VENUE piping shall be able to maintain the greater of the two following amounts of pressure:

1) 25% greater than the maximum design operating pressure of the system, or
2) 25 psi *(172 KPa)*.

4.7.1.8 Strainers and Pumps

4.7.1.8.1 Strainers

4.7.1.8.1.1 Strainer / Screen

All filter recirculation pumps, except those for vacuum filter installations, shall have a strainer/screen device on the suction side to protect the filtration and pumping equipment.

4.7.1.8.1.2 Materials

All material used in the construction of strainers and screens shall be:

1) Nontoxic, impervious, and enduring,

2) Able to withstand design stresses, and
3) Designed to minimize friction losses.

4.7.1.8.2 Pumping Equipment

4.7.1.8.2.1[A] Variable Frequency Drives

VFDs *may* be installed to control all recirculation and feature pumps.

4.7.1.8.2.2[A] Total Dynamic Head

The recirculation pump*(s)* shall have adequate capacity to meet the recirculation flow design requirements in accordance with the maximum TDH required by the entire RECIRCULATION SYSTEM under the most extreme operating conditions *(e.g., clogged filters in need of backwashing)*.

4.7.1.8.2.3 Required Flow Rate

The pump shall be designed to maintain design recirculation flows under all conditions.

4.7.1.8.2.4 Vacuum Limit Switches

Where vacuum filters are used, a vacuum limit switch shall be provided on the pump suction line.

4.7.1.8.2.5 Maximum

The vacuum limit switch shall be set for a maximum vacuum of 18 inches *(45.7 cm)* of mercury.

4.7.1.8.2.6 Pump Priming

All recirculation pumps shall be self-priming or flooded-suction.

4.7.1.8.2.7 Net Positive Suction Head Requirement

All recirculation pumps shall meet the minimum NPSH requirement for the system.

4.7.1.8.3[A] Operating Gauges

4.7.1.8.3.1 Vacuum Gauge

A compound vacuum-pressure gauge shall be installed on the pump suction line as close to the pump as possible.

4.7.1.8.3.2 Suction Lift

A vacuum gauge shall be used for pumps with suction lift.

4.7.1.8.3.3 Installed

A pressure gauge shall be installed on the pump discharge line adjacent to the pump.

4.7.1.8.3.4 Easily Read

Gauges shall be installed so they can be easily read.

4.7.1.8.3.5 Valves

All gauges shall be equipped with valves to allow for servicing under operating conditions.

4.7.1.9 Flow Measurement and Control

4.7.1.9.1[A] Flow Meters

A flow meter accurate to within +/- 5% of the actual design flow shall be provided for each filtration system.

4.7.1.9.1.1 Listed and Labeled

Flow meters shall be listed and labeled to NSF/ANSI Standard 50 by an ANSI-accredited certification organization.

4.7.1.9.2 Valves

All pumps shall be installed with a manual adjustable discharge valve to provide a backup means of flow control as well as for system isolation.

4.7.1.10[A] Flow Rates / Turnover Times

Table 4.7.1.10: Aquatic Venue Maximum Allowable Turnover Times

Type of Pools	Turnover Maximum
Activity Pools	2 hours or less
Diving Pools	8 hours or less
Interactive Play*	0.5 hours or less
Lazy River	2 hours or less
Plunge Pools	1 hour or less
Runout Slide	1 hour or less
Wading Pools*	1 hour or less
Wave Pools	2 hours or less
All Other Pools	6 hours or less
Surf Pools	Submit engineering justification from equipment manufacturer
*Shall have secondary disinfection systems	

Spa, Therapy, & Exercise Pools*		
Temperatures	**Load**	**Turnover Maximum**
≤ 72^0-93^0F (*22^0-34^0C*)	> 2500 gals/person (*9.46 m^3*)	4 hours or less
≤ 72^0-93^0F (*22^0-34^0C*)	> 450 gals/person (*1.7 m^3*)	2 hours or less

≤ 72^0-93^{0}F (*22^0-34^0*C)	≤ 450 gals/person (*1.7 m^3*)	1 hour or less
≥ 93-104^{0}F (*34^0-40^0*C)	All	0.5 hours or less
*Shall have secondary disinfection systems		

4.7.1.10.1 Maximum Allowable

All AQUATIC VENUES shall comply with the above maximum allowable TURNOVER TIMES shown in MAHC Table 4.7.1.10.

4.7.1.10.2[A] Calculated

The TURNOVER TIME shall be calculated based on the total volume of water divided by the flow rate through the filtration process.

4.7.1.10.2.1[A] Unfiltered Water

Unfiltered water such as water that may be withdrawn from and returned to the AQUATIC VENUE for such AQUATIC FEATURES as SLIDES by a pump separate from the filtration system, shall not factor into TURNOVER TIME.

4.7.1.10.3[A] Turnover Times

TURNOVER TIMES shall be calculated based solely on the flow rate through the filtration system.

4.7.1.10.3.1 Required

The required TURNOVER TIME shall be the lesser of the following options:

1) The specified time in MAHC Table 4.7.1.10, or
2) The time required for individual components *(e.g., three SKIMMERS with flow rates set by the manufacturer and an additional 20% for the main drains could exceed the minimum value in the table)*.

4.7.1.10.3.2 Total Volume

The total volume of the AQUATIC VENUE system shall include the AQUATIC VENUE and any surge/balance tank.

4.7.1.10.3.3 Supply Water

Where water is drawn from the AQUATIC VENUE to supply water to AQUATIC FEATURES *(e.g., SLIDES, tube rides)*, the water may be reused prior to filtration provided the DISINFECTANT and pH levels of the supply water are maintained at required levels.

4.7.1.10.4[A] Reuse Ratio

The ratio of INTERACTIVE WATER PLAY AQUATIC VENUE FEATURE water to filtered water shall be no greater than 3:1 in order to maintain the efficiency of the FILTRATION SYSTEM.

4.7.1.10.5[A] Flow Turndown System

For AQUATIC FACILITIES that intend to reduce the recirculation flow rate below the minimum required design values when the POOL is unoccupied, the flow turndown system shall be designed as follows in MAHC 4.7.1.10.5.1 through MAHC 4.7.1.10.5.2.

4.7.1.10.5.1 Flowrate

The system flowrate shall not be reduced more than 25% lower than the minimum design requirements and only reduced when the AQUATIC VENUE is unoccupied.

4.7.1.10.5.1.1 Clarity

The system flowrate shall be based on ensuring the minimum water clarity required under MAHC 5.7.6 is met before opening to the public.

4.7.1.10.5.1.2 Disinfectant Levels

The turndown system shall be required to maintain required DISINFECTANT and pH levels at all times.

4.7.1.10.5.2 Increase

When the turndown system is also used to intelligently increase the recirculation flow rate above the minimum requirement *(e.g., in times of peak use to maintain water quality goals more effectively)*, the following requirements shall be met at all times:

1) Velocity requirements inside of pipes *(per MAHC 4.7.1.7.2)*, and
2) Maximum filtration system flows.

4.7.2[A] Filtration

4.7.2.1 All Filters

4.7.2.1.1 Required

Filtration shall be required for all AQUATIC VENUES that recirculate water.

4.7.2.2 Granular Media Filters

4.7.2.2.1[A] General

4.7.2.2.1.1 Valves and Piping

The granular media filter system shall have valves and piping to allow isolation, venting, complete drainage *(for maintenance or inspections)*, and backwashing of individual filters.

4.7.2.2.1.2 Filtration Accessories

Filtration accessories shall include the following items:

1) Influent pressure gauge,
2) Effluent pressure gauge,
3) Backwash sight glass or other means to view backwash water clarity, and

4) Manual air relief system.

4.7.2.2.1.3[A] Listed

All filters shall be listed and labeled to NSF/ANSI 50 by an ANSI-accredited certification organization.

4.7.2.2.2[A] Filter Location and Spacing

4.7.2.2.2.1 Installed

Filters shall be installed with adequate clearance and facilities for ready and safe inspection, maintenance, disassembly, and repair.

4.7.2.2.2.2 Media Removal

A means and access for easy removal of filter media shall be required.

4.7.2.2.3 Filtration and Backwashing Rates

4.7.2.2.3.1[A] Operate

High-rate granular media filters shall be designed to operate at no more than 15 GPM per square foot *(37 m/h)* when a minimum bed depth of 15 inches *(38.1 cm)* is provided per manufacturer.

4.7.2.2.3.1.1 Less than Fifteen Inch Bed Depth

When a bed depth is less than 15 inches *(38.1 cm)*, filters shall be designed to operate at no more than 12 GPM per square foot (29 m/h).

4.7.2.2.3.2[A] Backwash System Design

The granular media filter system shall be designed to backwash each filter at a rate of at least 15 GPM per square foot (37 m/h) of filter bed surface area, unless explicitly prohibited by the filter manufacturer and approved at an alternate rate as specified in their NSF/ANSI 50 listing.

4.7.2.2.4[A] Minimum Filter Media Depth Requirements

The minimum depth of filter media cannot be less than the depth specified by the manufacturer.

4.7.2.2.5 Differential Pressure Measurement Gauges

Influent and effluent pressure gauges shall have the capability to measure up to a 20 pounds per square inch *(138 KPa)* increase in the differential pressure across the filter bed in increments of one pound per square inch *(6.9 KPa)* or less.

4.7.2.2.6[A] Coagulant Injection Equipment Installation

If coagulant feed systems are used, they shall be installed with the injection point located before the filters as far ahead as possible, with electrical interlocks in accordance with MAHC 4.7.3.2.1.3.

4.7.2.3 Precoat Filters

4.7.2.3.1 General

4.7.2.3.1.1 Listed

All precoat, filters *(i.e., pressure and vacuum)* shall be listed and labeled to NSF/ANSI 50 by an ANSI-accredited certification organization.

4.7.2.3.1.2 Appropriate Media

Filters should be used with the appropriate filter media as recommended by the filter manufacturer for maximum clarity and cycle length for AQUATIC VENUE use.

4.7.2.3.1.2.1 Listed, Labeled, and Sized

Filter media shall be listed and labeled to NSF/ANSI Standard 50 by an ANSI-accredited certification organization and within the size specifications provided by the filter manufacturer and NSF/ANSI 50.

4.7.2.3.1.2.2 Alternate Types

Alternate types of filter media shall be permitted in accordance with the filter manufacturer's recommendation for AQUATIC VENUE use.

4.7.2.3.1.2.3 NSF Standard

Alternate types of filter media shall be listed and labeled to NSF Standard 50 by and ANSI-accredited certification organization.

4.7.2.3.2[A] Filtration Rates

4.7.2.3.2.1 Vacuum Precoat

The design filtration rate for vacuum precoat filters shall not be greater than either:

1) 2 GPM per square foot *(4.9 m/h)*, or
2) 2.5 GPM per square foot *(6.1 m/h)* when used with a continuous precoat media feed *(commonly referred to as "body-feed")*.

4.7.2.3.2.2 Pressure Precoat

The design filtration rate for pressure precoat filters shall not be greater than 2 GPM per square foot *(4.9 m/h)* of effective filter surface area.

4.7.2.3.2.3 Calculate

The filtration surface area shall be based on the outside surface area of the media with the manufacturer's recommended thickness of precoat media and consistent with their NSF/ANSI 50 listing and labeling.

4.7.2.3.3[A] Precoat Media Introduction System Process

The precoat process shall follow the manufacturer's recommendations and requirements of NSF/ANSI Standard 50.

4.7.2.3.4[A] Continuous Filter Media Feed Equipment

4.7.2.3.4.1 Manufacturer Specification

If equipment is provided for the continuous feeding of filter media to the filter influent, the equipment shall be used in accordance with the manufacturer's specifications.

4.7.2.3.4.2 Filter Media Discharge

All discharged filter media shall be handled in accordance with local and state laws, rules, and regulations.

4.7.2.4 Cartridge Filters

4.7.2.4.1[A] Listed

Cartridge filters shall be installed in accordance with the filter manufacturer's recommendations and listed and labeled to NSF/ANSI 50 by an ANSI-accredited certification organization.

4.7.2.4.2[A] Filtration Rates

The design filtration rate for surface-type cartridge filter shall not exceed 0.30 GPM per square foot *(0.20 L/s/m^2).*

4.7.2.4.3[A] Supplied and Sized

Filter cartridges shall be supplied and sized in accordance with the filter manufacturer's recommendation for AQUATIC VENUE use.

4.7.2.4.4[A] Spare Cartridge

One complete set of spare cartridges shall be maintained on site in a clean and dry condition.

4.7.3[A] Disinfection and pH Control

4.7.3.1 Chemical Addition Methods

4.7.3.1.1 Disinfection and pH

DISINFECTION and pH control chemicals shall be automatically introduced through the RECIRCULATION SYSTEM.

4.7.3.1.1.1 Controller Used

A chemical controller, as specified in MAHC 4.7.3.2.8 shall be provided and used for MONITORING and control of DISINFECTANT and pH feed equipment.

4.7.3.1.1.2 Feeder

DISINFECTION and pH control chemicals shall be added using a feeder that meets the requirements outlined in MAHC 4.7.3.2.

4.7.3.2 Feed Equipment

4.7.3.2.1[A] General

4.7.3.2.1.1 Required

Chemical feeders shall be required in new or existing AQUATIC FACILITIES upon adoption of this CODE.

4.7.3.2.1.2 Feeders & Devices

The AQUATIC FACILITY shall be equipped with chemical feed equipment such as flow-through chemical feeders, electrolytic chemical generators, mechanical chemical feeders, chemical feed pumps, and AUTOMATED CONTROLLERS that are listed and labeled to NSF-ANSI 50 by an ANSI-accredited certification organization.

4.7.3.2.1.2.1 Specified by Manufacturer

Flow-through chemical feeders shall only be used with the chemical *(formulation, brand, size, and shape)* specified by the chemical feeder manufacturer.

4.7.3.2.1.3 Interlock Controls and No or Low Flow Deactivation

All chemical feeders in new or existing aquatic facilities shall be provided upon adoption of this CODE with an automatic means to be disabled through an electrical interlock with at least two of the following:

1) Recirculation pump power,
2) Flow meter/flow switch in the return line,
3) Chemical control power and paddle wheel or flow cell on the chemical controller ***if*** SAFETY test confirms feed systems are disabled through the controller when the pump is turned off, loses prime, or filters are backwashed.

4.7.3.2.1.4 Installation

The chemical feeders shall be installed according to the manufacturer's instructions.

4.7.3.2.1.4.1 Protective Cover

A physical BARRIER shall be installed between chemical feed pumps supplying acid or liquid hypochlorite solution and other POOL components to shield staff and equipment from chemical sprays from leaking connections.

4.7.3.2.2[A] Sizing of Disinfection Equipment

4.7.3.2.2.1 Sizing

Feeders shall be capable of supplying DISINFECTANT and pH control chemicals to the AQUATIC VENUE to maintain the minimum required DISINFECTION levels at all times in accordance with the MAHC.

4.7.3.2.2.2 Chlorine Dosing

All CHLORINE dosing and generating equipment including erosion feeders, or in line electrolytic and brine/batch generators, shall be designed with a capacity to provide the following:

1) Outdoor AQUATIC VENUES *(unstabilized)*: 4.0 lbs of FAC/day/10,000 gal *(1.8 kg FAC/day/37,854 L)* of POOL water;
2) Indoor AQUATIC VENUES *(unstabilized)*: 2.5 lbs FAC/day/10,000 gal *(1.1 kg FAC/day/37,854 L)* of POOL water.

4.7.3.2.2.3 Rates

The rates above are suggested minimums and in all cases the engineer shall validate the feed and production equipment specified.

4.7.3.2.3 Introduction of Chemicals

4.7.3.2.3.1 Separation

The injection point of DISINFECTION chemicals shall be located before any pH control chemical injection point with sufficient physical separation of the injection points to reduce the likelihood of mixing of these chemicals in the piping during periods of interruption of RECIRCULATION SYSTEM flow.

4.7.3.2.3.2 Backflow

Means of injection shall not allow BACKFLOW into the chemical system from the POOL system.

4.7.3.2.3.3 Coagulants

Coagulants shall be metered and injected through a pump system prior to the filters per the manufacturer's recommended rate.

4.7.3.2.4 Compressed Chlorine Gas

4.7.3.2.4.1 Prohibited for New Construction

Use of compressed CHLORINE gas shall be prohibited for new construction and after SUBSTANTIAL ALTERATION to existing AQUATIC FACILITIES.

4.7.3.2.4.2 In Existing Aquatic Facilities

Refer to MAHC 4.9.2.11 on the use of compressed CHLORINE gas in existing AQUATIC FACILITIES.

4.7.3.2.5[A] Types of Feeders

4.7.3.2.5.1 Liquid Solution Feeders

Liquid solution feeders shall include positive displacement pumps such as peristaltic pumps, diaphragm pumps, and piston pumps.

4.7.3.2.5.1.1 Feed Rates

Feed rates shall be locally adjusted on the pumps and also on/off controlled using an AUTOMATED CONTROLLER.

4.7.3.2.5.1.2 Routed

All chemical tubing that runs through areas where staff work shall be routed in PVC piping to support the tubing and or otherwise supported and protected to prevent leaks.

4.7.3.2.5.1.3 Size

The double containment PVC pipe shall be of sufficient size to allow for easy replacement of tubing.

4.7.3.2.5.1.4 Turns

Any necessary turns in the piping shall be designed so as to prevent kinking of the tubing.

4.7.3.2.5.2 Erosion

Erosion feeders may be pressure, pressure differential, or spray erosion types.

4.7.3.2.5.2.1 Dry Chemical Feeders

Dry chemicals shall be granules or tablets.

4.7.3.2.5.2.2 Located

Feeders shall have isolation valves on each side of the feeder to be closed before opening the unit.

4.7.3.2.5.2.3 Source Water

Erosion feeders shall use AQUATIC VENUE water post-filtration as the source water unless approved by the feeder manufacturer.

4.7.3.2.5.3 Gas Feed Systems

Carbon dioxide and ozone are the only gas feed systems permitted in AQUATIC FACILITIES.

4.7.3.2.5.4 Ventilation

Proper ventilation shall be required for all gas systems.

4.7.3.2.5.5 Alarms

Where CO_2 cylinders are located indoors, a monitor and alarm shall be provided to alert PATRONS/operator of high CO_2 and/or low O_2 levels.

4.7.3.2.5.6 UV Systems

Where used, UV systems shall be installed in the RECIRCULATION SYSTEM after the filters.

4.7.3.2.5.6.1 Bypass

A bypass pipe that is valved on both ends shall be installed to allow maintenance on the UV unit while the POOL is in operation.

4.7.3.2.5.6.2 Interlock

UV system operation shall be interlocked with the recirculation pump so that power to the UV system is interrupted when there is no water flow to the UV unit per MAHC 4.7.3.2.1.3.

4.7.3.2.6 Salt Electrolytic Chlorine Generators, Brine Electrolytic Chlorine, or Bromine Generators

Halogen generator equipment shall be marked with an EPA establishment number.

4.7.3.2.6.1 Salt Electrolytic Chlorine Generators

In-line generator*(s)* or brine *(batch)* generator*(s)* shall be permitted on AQUATIC VENUES.

4.7.3.2.6.2 In-line Method

In-line generators shall use POOL-grade salt dosed into the AQUATIC VENUE to produce and introduce CHLORINE into the AQUATIC VENUE treatment loop through an electrolytic chamber.

4.7.3.2.6.3 Batch Method

Brine *(Batch)* generators shall produce CHLORINE through an electrolytic cell.

4.7.3.2.6.3.1 Chlorine Production

CHLORINE shall be produced from brines composed of POOL-grade salt.

4.7.3.2.6.4 TDS Readout

Electrolytic generators shall have a TDS or salt *(NaCl)* readout and a low salt indicator.

4.7.3.2.6.5 Feed Rate

The feed rate shall be adjustable from zero *(0)* to full range.

4.7.3.2.6.6 UL Standard

The generator unit shall be listed and labeled to UL 1081 *(for electrical/fire/shock SAFETY)* by an ANSI-accredited certification organization.

4.7.3.2.6.7 Interlock

The generator*(s)* shall be interlocked per MAHC 4.7.3.2.1.3.

4.7.3.2.6.8 Installed

The generator units shall be installed according to the manufacturer's instructions.

4.7.3.2.6.8.1 Saline Content

The saline content of the POOL water shall be maintained in the required range specified by the manufacturer.

4.7.3.2.7[A] Feeders for pH Adjustment

4.7.3.2.7.1 Provided

Feeders for pH adjustment shall be provided on all AQUATIC VENUES upon adoption of this CODE as in MAHC 4.7.3.2.1.2.

4.7.3.2.7.2 Approved Substances

Approved substances for pH adjustment shall include but not be limited to muriatic *(hydrochloric)* acid, sodium bisulfate, carbon dioxide, sulfuric acid, sodium bicarbonate, and soda ash.

4.7.3.2.7.3 Adjustable

pH adjustment feeders shall be adjustable from zero *(0)* to full range.

4.7.3.2.7.4 Marked

Reservoirs shall be clearly marked and labeled with contents.

4.7.3.2.8[A] Automated Controllers

4.7.3.2.8.1 Required

AUTOMATED CONTROLLERS shall be installed for MONITORING and turning on or off chemical feeders used for pH and disinfectants at all AQUATIC VENUES.

4.7.3.2.8.1.1 Existing Aquatic Facilities

For existing AQUATIC FACILITIES, AUTOMATED CONTROLLERS shall be required within one year from adoption of this CODE.

4.7.3.2.8.2 NSF Standard

All automated chemical controllers for pH and disinfectant MONITORING/control shall be listed and labeled to NSF/ANSI 50 by an ANSI-accredited certification organization.

4.7.3.2.8.3 Operation Manuals

Operation manuals or other instructions that give clear directions for cleaning and calibrating AUTOMATED CONTROLLER probes and sensors shall be provided in close proximity to the AUTOMATED CONTROLLER.

4.7.3.2.8.4 Set Point

A set point shall be used to target the disinfectant level and the pH level.

4.7.3.3 Secondary Disinfection Systems

4.7.3.3.1 General Requirements

4.7.3.3.1.1[A] ANSI Listing and Labeling

SECONDARY DISINFECTION SYSTEMS shall be listed and labeled to ANSI/NSF 50 by an ANSI-accredited certification organization approved by the AHJ.

4.7.3.3.1.1.1 Marked

SECONDARY DISINFECTION SYSTEM equipment shall be marked with an EPA establishment number.

4.7.3.3.1.2[A] Required Facilities

The new construction or SUBSTANTIAL ALTERATION of the following INCREASED RISK AQUATIC VENUES shall be required to use a SECONDARY DISINFECTION SYSTEM after adoption of this CODE:

1. AQUATIC VENUES designed primarily for children under 5 years old, such as
    a. Wading pools,
    b. INTERACTIVE WATER PLAY VENUES with no standing water, and
2. Therapy pools.

4.7.3.3.1.3 Other Aquatic Venues

Optional SECONDARY DISINFECTION SYSTEMS may be installed on other AQUATIC VENUES not specified in MAHC 4.7.3.3.1.2.

4.7.3.3.1.4 Labeled

If installed and labeled as SECONDARY DISINFECTION SYSTEMS, then they shall conform to all requirements specified under MAHC 4.7.3.3.

4.7.3.3.1.5 Conform

If not labeled as SECONDARY DISINFECTION SYSTEMS, then they shall be labeled as SUPPLEMENTAL TREATMENT SYSTEMS and conform to requirements listed under MAHC 4.7.3.4.

4.7.3.3.2[A] 3-log Inactivation and Oocyst Reduction

4.7.3.3.2.1[A] 3-log Inactivation

SECONDARY DISINFECTION SYSTEMS shall be designed to achieve a minimum 3-log *(99.9%)* reduction in the number of infective *Cryptosporidium parvum* OOCYSTS per pass through the SECONDARY DISINFECTION SYSTEM.

4.7.3.3.2.2[A] *Installation*

The SECONDARY DISINFECTION SYSTEM shall be located in the treatment loop *(post filtration)* and treat a portion *(up to 100%)* of the filtration flow prior to return of the water to the AQUATIC VENUE or AQUATIC FEATURE.

4.7.3.3.2.3 Manufacturer's Instructions

The SECONDARY DISINFECTION SYSTEM shall be installed according to the manufacturer's directions.

4.7.3.3.2.4[A] Minimum Flow Rate Calculation

The flow rate *(Q)* through the SECONDARY DISINFECTION SYSTEM shall be determined based upon the total volume of the AQUATIC VENUE or AQUATIC FEATURE *(V)* and a prescribed dilution time *(T)* for theoretically reducing the number of assumed infective

Cryptosporidium OOCYSTS from an initial total number of 100 million *(10^8)* OOCYSTS to a concentration of one OOCYST/100 mL.

4.7.3.3.2.5[A] Equation

Accounting for a 3 log *(99.9%)* reduction of infective *Cryptosporidium* OOCYSTS through the SECONDARY DISINFECTION SYSTEM with each pass, the SECONDARY DISINFECTION SYSTEM flow rate *(Q)* shall be:

1) Q = V x {[14.8 – ln (V)] / (60 x T)}, where:
   - Q = SECONDARY DISINFECTION SYSTEM flow rate *(gpm)*
   - V = Total water volume of the AQUATIC VENUE or AQUATIC FEATURE, including surge tanks, piping, equipment, etc. *(gals)*
   - T = Dilution time *(hrs.)*

4.7.3.3.2.6 Time for Dilution Reduction

The dilution time shall be the lesser of nine hours or 75% of the uninterrupted time an AQUATIC VENUE is closed in a 24 hour period.

4.7.3.3.2.7[A] Flow Rate Measurements

Where a SECONDARY DISINFECTION SYSTEM is installed, a means shall be installed to confirm the required flow rate to maintain a minimum 3 log *(99.9%)* reduction of infective *Cryptosporidium* OOCYSTS at the minimum flow rate.

4.7.3.3.2.7.1 Flow Rate Defined

The minimum required flow rate through the SECONDARY DISINFECTION SYSTEM shall be as defined in MAHC 4.7.3.3.2.5.

4.7.3.3.3[A] Ultraviolet Light Systems

To prevent mercury exposure, UV systems shall be installed to avoid lamp breakage according to the guidelines in EPA 815-R-06-007 Appendix E.

4.7.3.3.3.1[A] Third Party Validation

UV equipment shall be third party validated in accordance with the practices outlined in the *US EPA Ultraviolet Disinfectant Guidance Manual* dated November, 2006, publication number EPA 815-R-06-007.

4.7.3.3.3.1.1[A] Validation Standard

The *US EPA Ultraviolet Disinfectant Guidance Manual* shall be considered a recognized national STANDARD in the MAHC.

4.7.3.3.3.2 Suitable for Intended Use

UV systems and all materials used therein shall be suitable for their intended use and be installed:

1) In accordance with the MAHC,

2) As listed and labeled to a specific STANDARD by an ANSI-accredited certification organization, and
3) As specified by the manufacturer.

4.7.3.3.3.3 Installation

The UV equipment shall be installed after the filtration and before addition of primary DISINFECTANT.

4.7.3.3.3.3.1 Labeled

UV equipment shall be labeled with the following design specifications: maximum flow rate, minimum transmissivity, minimum intensity, and minimum dosage.

4.7.3.3.3.3.2 Strainer Installation

An inline strainer shall be installed after the UV unit to capture broken lamp glass or sleeves.

4.7.3.3.3.4 Electrically Interlocked

The equipment shall be electrically interlocked with feature pump*(s)* or automated feature supply valves, such that when the UV equipment fails to produce the required dosage as measured by automated sensor, the water features do not operate.

4.7.3.3.3.4.1 Operation

UV systems shall not operate if the RECIRCULATION SYSTEM is not operating.

4.7.3.3.3.5 Calibrated UV Sensors

The UV equipment shall be complete with calibrated UV sensors, which record the output of all the UV lamps installed in a system.

4.7.3.3.3.5.1 Multiple Lamps

Where multiple lamps are fitted, sufficient sensors shall be provided to measure each lamp.

4.7.3.3.3.5.2 Fewer Sensors

If the design utilizes fewer sensors than lamps, the location of lamps and sensors shall be such that the output of all lamps is adequately measured.

4.7.3.3.3.6 Equipment Audit

In order to ensure that equipment supplied meets all the requirements of the STANDARD the manufacturer shall maintain a quality assurance system audited on a regular basis to a recognized quality STANDARD.

4.7.3.3.3.6.1 Accreditation

An ISO9000:2000 accreditation or listing to NSF Standard 50 are both acceptable methods of meeting this equipment requirement.

4.7.3.3.3.7 Automated Shut Down

The automated shut down of the UV equipment for any reason shall initiate a visual alarm or other indication which will alert staff on-site or remotely.

4.7.3.3.3.7.1 Signage

Signage instructing staff or PATRONS to notify facility management shall be posted adjacent to the visual indication.

4.7.3.3.3.7.2 Not Staffed

If the AQUATIC FACILITY is not staffed, the sign shall include a means to contact management whenever the AQUATIC FACILITY is in use.

4.7.3.3.3.8 Reports and Documentation

The UV equipment shall be supplied with the appropriate validation reports and documentation for that equipment model.

4.7.3.3.3.9 Manufacturer 3-log Inactivation Chart

This documentation will include a graph or chart indicating the dose at which a 3-log inactivation is guaranteed for the system in question.

4.7.3.3.3.9.1 Reduction Equivalent Dose Bias

This dose shall be inclusive of validation factors and RED BIAS.

4.7.3.3.3.9.2 System Performance Curves

System performance curves that do not include such factors are not considered validated systems.

4.7.3.3.3.10[A] Minimum RED

Validation records shall include the graph indicating the minimum intensity reading required at the operational flow for the minimum RED required to achieve 3-log reduction.

4.7.3.3.3.10.1 Minimum Intensity Shown

Where systems are validated to a specific dose, the graph shall show the minimum intensity reading required at the operational flow for that dose.

4.7.3.3.3.11 Recommended Validation Protocol

Based on the recommended validation protocol presented in the US EPA Disinfection Guidance Manual, UV reactors certified by ÖNORM and DVGW for a *Bacillus subtilis* RED of 40mJ/cm^2 shall be granted 3-log *Cryptosporidium* and 3-log *Giardia* inactivation credit as required in this CODE.

4.7.3.3.4 Ozone Disinfection

4.7.3.3.4.1[A] 3-log Inactivation

SECONDARY DISINFECTION SYSTEMS using ozone shall provide the required inactivation of *Cryptosporidium* in the full flow of the SECONDARY DISINFECTION SYSTEM after any side-stream has remixed into the full flow of the SECONDARY DISINFECTION SYSTEM.

4.7.3.3.4.2[A] Third Party Validation

Ozone systems shall be validated by an ANSI-accredited third party testing and certification organization to confirm that they provide a minimum 3 log *(99.9%)* inactivation of *Cryptosporidium* in the full SECONDARY DISINFECTION SYSTEM flow after any side-stream has remixed into the full SECONDARY DISINFECTION SYSTEM flow and prior to return of the water to the AQUATIC VENUE or AQUATIC FEATURE recirculation treatment loop.

4.7.3.3.4.3[A] Suitable for Use

Ozone systems and all materials used therein shall be suitable for their intended use and be installed:

1) In accordance with all applicable requirements,
2) As listed and labeled to a specific STANDARD by an ANSI-accredited certification organization, and
3) As specified by the manufacturer.

4.7.3.3.4.4 Ozone System Components

An ozone system shall be a complete system consisting of the following *(either skid-mounted or components)*:

1) Ozone generator,
2) Injector / injector manifold,
3) Reaction tank *(contact tank)* / mixing tank / degas tower,
4) Degas valve *(if applicable, to vent un-dissolved gaseous ozone)*,
5) Ozone destruct *(to destroy un-dissolved gaseous ozone)*,
6) ORP monitor / controller,
7) Ambient ozone monitor / controller,
8) Air flow meter / controller, and
9) Water BACKFLOW prevention device in gas delivery system.

4.7.3.3.4.5 Appropriate Installation

These components *(or skid)* shall be installed as specified by the manufacturer to maintain the required system validation as noted above.

4.7.3.3.4.6 ORP Monitor

The ozone generating equipment shall be designed, sized, and controlled utilizing an ORP monitor / controller *(independent of and in addition to any halogen ORP monitor/controller)*.

4.7.3.3.4.6.1 Placed Downstream

The device shall be placed in the AQUATIC VENUE and AQUATIC FEATURE recirculation water downstream of the ozone side-stream loop and before the halogen feed location.

4.7.3.3.4.6.2 Minimum ORP Reading

The minimum ORP reading shall be no less than 600 mV measured directly after *[one to five feet (30.5 cm to 1.5 m)]* the ozone side-stream remixes into the full flow of the RECIRCULATION SYSTEM.

4.7.3.3.4.6.3 Maximum ORP Reading

The maximum ORP reading shall be no greater than 900 mV.

4.7.3.3.4.7 Installation and Injection Point

The ozone system injection point shall be located in the AQUATIC VENUE return line after the filtration and heating equipment, prior to the primary disinfectant injection point.

4.7.3.3.4.7.1 Injection and Mixing

The injection and mixing system shall not prevent the attainment of the recirculation rate required elsewhere in this CODE.

4.7.3.3.4.7.2[A] Gas Monitor / Controller

An ambient ozone gas monitor/controller located adjacent to the ozone reactor/contact tank shall be utilized to disable the ozone system in the event of an ozone gas leak.

4.7.3.3.4.8 Comply with Fire Code

Ozone system installations shall comply with the NFPA 1 Fire Code or the International Fire Code and any other CODES, STANDARDS, or requirements as mandated by the AHJ.

4.7.3.3.4.9 Air Space Testing

At the time the ozone generating equipment is installed, again after 24 hours of operation, and annually thereafter, the air space within six inches of the AQUATIC VENUE water shall be tested to determine compliance of less than 0.1 ppm *(mg/L)* gaseous ozone.

4.7.3.3.4.9.1 Results

Results of the test shall be maintained on site for review by the AHJ.

4.7.3.3.4.10 Automatic Shut Down

Automatic shutdown shall occur under any condition that would result in the ozone system not operating within the established parameters needed to achieve 3-log inactivation of *Cryptosporidium (i.e. low feed gas supply, loss of vacuum or pressure, high dew point in feed air, water in ozone gas delivery line)*.

4.7.3.3.4.10.1 Electrically Interlocked

The equipment shall be electrically interlocked with AQUATIC VENUE pump*(s)* or automated feature supply valves, such that when the ozone equipment fails to produce the required dosage as measured by ORP, the AQUATIC VENUES do not operate.

4.7.3.3.4.11 ORP Reading Alarm or Visual Indication

If the ORP reading for the ozone system drops below 600 mV *(regardless of the cause)* a visual alarm or other indication shall be initiated that will alert staff on-site or remotely.

4.7.3.3.4.11.1 Signage

Signage to notify facility management shall be present adjacent to the visual alarm.

4.7.3.3.4.12 Regular Audits

In order to ensure that the supplied ozone system meets all the requirements of the STANDARD, the manufacturer shall maintain a quality system audited on a regular basis to a recognized quality STANDARD.

4.7.3.3.4.12.1 Listed

Ozone equipment shall be listed to NSF/ANSI Standard 50.l.

4.7.3.3.4.13 Reports and Documentation

The ozone system shall be supplied with the appropriate validation reports and documentation for that equipment model.

4.7.3.3.4.13.1 3-log Inactivation Chart

Ozone validation reports shall include a graph, chart, or other documentation which clearly indicates the required operating parameters for which a 3-log inactivation is guaranteed for the system in question.

4.7.3.3.4.13.2 Inclusive

This dose shall be inclusive of validation factors.

4.7.3.3.4.13.3 System Performance Curves

System performance curves that do not include such factors are not considered validated systems.

4.7.3.4 Supplemental Treatment Systems

4.7.3.4.1 General Requirements

4.7.3.4.1.1[A] Optional

AQUATIC VENUES that do not require SECONDARY DISINFECTION SYSTEMS may install SUPPLEMENTAL TREATMENT SYSTEMS for the purpose of enhancing overall system performance and improving water quality.

4.7.3.4.1.2 Not Required

Supplemental treatment systems shall not be required on any aquatic venues.

4.7.3.4.1.3 Clearly Noted

The AQUATIC FACILITY operating instructions shall clearly note that these SUPPLEMENTAL TREATMENT SYSTEMS do not meet the requirements of a SECONDARY DISINFECTION SYSTEM, and as such, are only considered SUPPLEMENTAL TREATMENT SYSTEMS.

4.7.3.4.1.4 No 3-log Inactivation Required

SUPPLEMENTAL TREATMENT SYSTEMS shall meet all of the requirements of this CODE, except:

1) They do not need to achieve a 3-log *(99.9%)* inactivation of *Cryptosporidium parvum* as required in MAHC 4.7.3.3,
2) They do not need to be able to reduce the total number of infective OOCYSTS to one OOCYST per 100 mL as required in MAHC 4.7.3.3, and
3) Except as noted in MAHC 4.7.3.4.2 and 4.7.3.4.3 below.

4.7.3.4.1.5 Clearly Labeled

Each system shall be clearly labeled, "Supplemental Water Treatment System—Does Not meet the requirements for Secondary DISINFECTION."

4.7.3.4.2[A] Ultraviolet Light

4.7.3.4.2.1 UV as Supplemental Treatment Requirement

When UV is used as a SUPPLEMENTAL TREATMENT SYSTEM, all requirements of MAHC 4.7.3.3.3.2 through 4.7.3.3.3.4 shall be met.

4.7.3.4.2.3 Water Features

Water features shall not require shut off if the supplemental UV system does not produce the required dosage.

4.7.3.4.2.4 Exempt

The equipment is exempt from the validation requirements of MAHC 4.7.3.3.3.1.

4.7.3.4.3[A] Ozone

4.7.3.4.3.1 Ozone as Supplemental Treatment Requirement

When ozone is used as a SUPPLEMENTAL TREATMENT SYSTEM, all requirements of MAHC 4.7.3.3.4.3 thru 4.7.3.3.4.9 shall be met.

4.7.3.4.3.2 Maximum ORP Reading

The maximum ORP reading shall be no greater than 900 mV.

4.7.3.4.4[A] Copper / Silver Ion Systems

4.7.3.4.4.1 Only EPA-Registered Disinfectants

Only those systems that are EPA-REGISTERED for use as disinfectants in AQUATIC VENUES or SPAS in the United States shall be permitted.

4.7.3.4.4.2 Suitable

Copper/silver systems, and all materials used therein, shall be suitable for their intended use.

4.7.3.4.4.3 Installed

Copper/silver systems, and all materials used therein, shall be installed in accordance with all applicable requirements and manufacturer's instructions.

4.7.3.4.5[A] Ultraviolet Light / Hydrogen Peroxide Systems

UV light / hydrogen peroxide combination systems shall be prohibited for use in AQUATIC FACILITIES.

4.7.3.5[A] Water Quality Testing Devices and Kits

4.7.3.5.1 Compliance

WQTDs and kits shall be listed and labeled to NSF/ANSI 50 by an ANSI-accredited certification organization.

4.7.3.5.2 Water Clarity Device

Refer to MAHC 5.7.6 for guidance on water clarity devices.

4.7.3.6[A] Microbiological Testing Equipment

4.7.3.6.1 EPA-Approved

Microbiological testing equipment and methods shall be

1) EPA-Approved, EPA-Accepted, EPA-Equivalent,
2) Conforming to the latest edition of *Standard Methods for the Examination of Water and Wastewater*, or
3) Listed and labeled to NSF/ANSI 50 by an ANSI-accredited certification organization.

4.7.4[A] Water Replenishment System

4.7.4.1[A] Discharge and Measure

A means of intentionally discharging and measuring or calculating the volume of both discharged AQUATIC VENUE water and filter backwash wastewater *(or alternate means of achieving the same result)* shall be provided.

4.7.4.1.1[A] Alternate System

An alternate system capable of removing an equivalent amount of dissolved organic compounds shall also be acceptable in lieu of discharging AQUATIC VENUE water.

4.7.4.1.1.1 Product Water

When an alternate system is used, the return water from the alternate system shall maintain total organic carbon concentrations that are less than or equal to tap water.

4.7.4.1.2 Discharge

This system shall be designed to discharge *(or treat and reuse)* AQUATIC VENUE water at a rate of up to four gallons *(15 L)* per BATHER per day per AQUATIC VENUE.

4.7.5 Spas

4.7.5.1[A] General

4.7.5.1.1 Requirements

SPAS shall conform to the design, operation, and maintenance requirement of AQUATIC VENUES except as required below.

4.7.5.2 Flow Rates/Turnover Times

4.7.5.2.1 Maximum Allowable

All SPAS as defined in the MAHC shall be designed to have a maximum allowable TURNOVER TIME of 0.5 hour or less.

4.7.5.2.2 Turnover Times

TURNOVER TIMES shall be calculated based solely on the flow rate through the filtration system.

4.7.5.3 Filtration System Inlets

SPAS shall have a minimum of two adjustable filter system INLETS spaced at least three feet *(0.9 m)* apart and designed to distribute flow evenly.

4.7.5.4 Jet System Inlets

4.7.5.4.1 Air Flow

Air flow shall be permitted through the jet system and/or when injected post-filtration.

4.7.5.4.2 Skimmer

Submerged suction SKIMMERS shall be allowed provided that the manufacturer's recommendations for use are followed.

4.8 Decks and Equipment

4.8.1 Decks

4.8.1.1 General Standards for All Decks

4.8.1.1.1 Constructed

DECKS shall be constructed in conformance with all applicable provisions of this chapter.

4.8.1.1.2[A] Lifeguard Placement and Safety Considerations

DECKS shall be designed to allow for QUALIFIED LIFEGUARD placement per the zone of BATHER surveillance in MAHC 6.3.3.1.1 and SAFETY areas and equipment in MAHC 4.8.5.

4.8.1.1.2.1[A] Deck Clearance

DECKS shall have a minimum of four feet *(1.2 m)* of clearance from AQUATIC VENUE edge to fencing or other obstruction to allow for QUALIFIED LIFEGUARD transit, roaming, or change of positioning to maximize viewing of the zone of BATHER surveillance as well as execution of water extrication.

4.8.1.1.2.2[A] Access Points

Access points shall be provided to QUALIFIED LIFEGUARDS to transit to QUALIFIED LIFEGUARDS positions.

4.8.1.1.2.3[A] Bather Zone Surveillance

The designer and owner shall consider impact on BATHER zone surveillance when determining placement of structural, operational, and theming elements.

4.8.1.1.2.3.1 Elements for Deck Placement

These elements shall include but are not limited to chairs, fencing, ADA access equipment, and AQUATIC FEATURES.

4.8.1.1.3 Joints or Gaps

Conditions between adjacent DECK materials, components, and concrete pours shall not have open joints or gaps larger than 3/16 inches wide (4.8 *mm)*, nor a maximum difference in vertical elevation of ¼ inches *(6.4 mm)*.

4.8.1.1.3.1 Vertical Elevation

Any change in vertical elevation shall be considered an edge condition.

4.8.1.1.3.2 Fillers

Open joints or gaps larger than 3/16 inches *(4.8 mm)* wide or with vertical elevations exceeding ¼ inches *(6.4 mm)* shall be rectified using appropriate fillers.

4.8.1.1.3.3 Sealants

The use of fillers such as caulk or sealant in joints or gaps shall be permitted for expansion and contraction.

4.8.1.1.3.4 No Violation

The use of fillers such as caulk or sealant in joints or gaps shall not be in violation of MAHC 4.8.1.1.3.

4.8.1.1.4 Rounded Edges

All DECK edges shall be beveled, rounded, or otherwise relieved to eliminate sharp corners.

4.8.1.1.5 Minimize Cracks

Joints in DECKING shall be provided to minimize the potential for CRACKS due to a change in elevation, for movement of the slab and for shrinkage control.

4.8.1.1.6[A] Concrete Decking

Where concrete is used as a DECK material, it shall be installed in accordance with the latest edition of the American Concrete Institute *(ACI)* Standards and in accordance with local building CODES.

4.8.1.2[A] Standards for Perimeter Decks

4.8.1.2.1 Impervious

Finish materials for the PERIMETER DECK shall be suitable for the POOL environment, non-toxic, and substantially impervious.

4.8.1.2.2 Watertight Expansion

Continuous watertight EXPANSION JOINT material shall be provided between PERIMETER DECKS and POOL coping.

4.8.1.2.2.1 Expansion Joint

Where applicable, the EXPANSION JOINT shall be designed and constructed so as to protect the coping and its mortar bed from damage as a result of movement of adjoining DECK.

4.8.1.2.3 Watertight Expansion

All conditions between adjacent concrete PERIMETER DECK pours shall be constructed with watertight EXPANSION JOINTS.

4.8.1.2.3.1 Joint Measurements

Joints shall be at least 3/16 inches *(5 mm)* in continuous width.

4.8.1.2.3.2 Vertical Differential

The maximum allowable vertical differential across a joint shall be ¼ inches *(6.5 mm)*.

4.8.1.3 Drains

Refer to MAHC 4.11.4 for additional guidance on drains.

4.8.1.3.1[A] Slope

DECKS shall be sloped away from the AQUATIC VENUE and in accordance with MAHC Table 4.8.1.3 below.

Table 4.8.1.3 Minimum Slopes for Drainage

Surface	Minimum Slope
Smooth finishes; such as tile, hand-finished concrete & lightly-broomed concrete	1/8 inch per foot *(3.2 mm/30.5 cm)*
Moderately textured finishes; such as exposed aggregate or medium-broomed concrete	1/4 inch per foot *(6.4 mm/30.5 cm)*
Heavily textured finishes; such as brick *(where permitted)*	3/8 inch per foot *(9.5 mm/30.5 cm)*

4.8.1.3.1.1 Accessible Routes

Where DECK areas or portions thereof serve as ACCESSIBLE ROUTES, slopes in any direction shall not exceed ADA requirements.

4.8.1.3.1.2 All Water

All water that touches areas defined as DECK, including water originating in the AQUATIC VENUE, shall drain effectively to either perimeter areas or to DECK drains.

4.8.1.3.1.3 Remove Wastewater

Drainage shall remove AQUATIC VENUE water that splashes outside of the AQUATIC VENUE and beyond a POOL gutter system, DECK cleaning water, and rain water without leaving standing water.

4.8.1.3.2 Placement

The placement of DECK drains, where provided, shall effectively carry water away from the AQUATIC VENUE and off the DECK without ponding.

4.8.1.3.3[A] Cross Connection Control

There shall be no direct connection between the DECK drains and the sanitary or storm sewer system, or the AQUATIC VENUE gutter or RECIRCULATION SYSTEM.

4.8.1.3.3.1 Discharge to Sewer or Other Ground Water

If the AHJ requires an outdoor POOL to have DECK drains that discharge to a storm sewer system, ground surface, or holding pond, the POOL shall be plumbed through an air-gap, BACKFLOW preventer, or other approved device as allowed by the AHJ.

4.8.1.3.3.2[A] No Drain

DECK drains shall not drain to the POOL, POOL gutter, or RECIRCULATION SYSTEMS.

4.8.1.3.4 Drain Bodies

Drain receptacles shall consist of non-CORROSIVE or corrosion-resistant materials.

4.8.1.3.5 Drain Covers

Drain covers shall be suitable for bare foot traffic with openings no greater than ½ inch *(1.3 cm)* and easily removable with a simple tool to facilitate regular cleaning.

4.8.1.4 Materials / Slip Resistance

4.8.1.4.1 General

PERIMETER DECK and POOL DECK shall be constructed with a uniform and easily cleaned surface such as concrete, tile, manufactured or acrylic surfaces.

4.8.1.4.2[A] Slip Resistance

All DECKS shall have slip-resistant, textured finishes, which are not conducive to slipping under contact of bare feet in wet or dry conditions.

4.8.1.4.2.1 Coefficient of Friction

All surfaces required to be slip-resistant shall have a minimum dynamic coefficient of friction at least equal to the requirements of ANSI A137.1-2012 for that installation as measured by the DCOF AcuTest.

4.8.1.4.3[A] Carpet

Carpet and artificial turf shall be prohibited materials for PERIMETER DECK and POOL DECK.

4.8.1.4.4[A] Wood

Wood shall be a prohibited material for use as PERIMETER DECK.

4.8.1.4.5[A] Dry Deck

DRY DECK shall be easily maintained and not create a public health hazard.

4.8.1.4.5.1 Not Required

DRY DECK shall not be required to be hard-paved or impervious.

4.8.1.4.5.2 Wood Decking

Wood DECKING may be permitted for DRY DECK.

4.8.1.4.6[A] Landscaping

Loose plant material or bedding shall not be permitted within PERIMETER DECKS.

4.8.1.4.6.1 Stable Materials

Stable materials are permitted.

4.8.1.5[A] Deck Size / Width

4.8.1.5.1 Perimeter Deck

4.8.1.5.1.1[A] Width

PERIMETER DECKS shall be four feet *(1.2 m)* minimum in unobstructed width around the POOL perimeter as prescribed in this section.

4.8.1.5.1.1.1 Circulation Path

Perimeter deck may serve as part of the circulation path.

4.8.1.5.1.1.2 Flush with Pool Wall

PERIMETER DECK areas shall be flush with POOL walls/copings except where special conditions exist, such as elevated beam or parapet, raised transfer walls, or as permitted by other sections of this CODE.

4.8.1.5.1.2[A] Perimeter Decking

PERIMETER DECKS shall be provided around 100% of the AQUATIC VENUE perimeter except where special conditions exist as permitted by other sections of this CODE.

4.8.1.5.1.3[A] Unguarded Aquatic Venues

For unguarded POOLS, PERIMETER DECKS shall be provided in compliance with at least one of two options:

1) Provide PERIMETER DECK around 100% of the of the POOL perimeter; or
2) Provide PERIMETER DECK such that the entire perimeter and depth of the POOL is readily reachable by a pole and hook from the PERIMETER DECK.

4.8.1.5.1.4 Spectator Seating

Refer to MAHC 4.6.10 for more information on spectator areas.

4.8.1.5.2 Fixed Equipment

4.8.1.5.2.1 Unobstructed Deck

Unobstructed DECK area four feet *(1.2 m)* minimum in width shall be provided for access around:

1) Diving equipment,
2) Special feature stairways *(such as a WATERSLIDE)*,
3) Lifeguard stands,
4) Diving boards,
5) Similar DECK equipment,
6) ADA access equipment, and
7) Structural columns.

4.8.1.5.2.2 Circulation Path

This unobstructed area may overlap the CIRCULATION PATH.

4.8.1.5.2.3 Queuing Space

Where reasonably anticipated, queuing space shall be provided at applicable equipment to minimize encroachment into the CIRCULATION PATH.

4.8.1.5.2.4 Free Space

Free area around equipment may consist of PERIMETER DECK and/or POOL DECK, as applicable.

4.8.1.5.3 Circulation Path

4.8.1.5.3.1 Conformance

A continuous and unobstructed CIRCULATION PATH shall be provided in conformance with ADA requirements for an ACCESSIBLE ROUTE.

4.8.1.5.3.2 Equipment and Furniture

DECK furniture locations shall be designed not intrude upon any CIRCULATION PATH.

4.8.1.5.3.3 Connect

CIRCULATION PATHS shall connect all site amenities, entrances and exits as required by ADA.

4.8.1.5.3.4 Deck Types

CIRCULATION PATHS may consist of any combination of permitted DECK types.

4.8.1.6 Wing Walls or Peninsulas

4.8.1.6.1[A] No Perimeter Deck

WING WALLS or PENINSULAS less than 18 inches *(45.7 cm)* in width shall not be considered a part of the PERIMETER DECK.

4.8.1.6.1.1 Use by Lifeguards

A WING WALL or PENINSULA greater than 18 inches *(45.7 cm)* wide but less than 48 inches *(1.2 m)* wide may be used by QUALIFIED LIFEGUARD personnel but shall not be considered as part of the PERIMETER DECK.

4.8.1.6.1.2 Slip Resistant

Any WING WALL or PENINSULA intended to be accessed by QUALIFIED LIFEGUARDS shall be constructed of slip-resistant materials.

4.8.1.6.2[A] Perimeter Overflow System

If it is impractical to design a POS into the WING WALL or PENINSULA due to width or height, then the overflow system may bypass the WING WALL or PENINSULA.

4.8.1.6.3[A] Pool Perimeter

WING WALLS and PENINSULAS shall be considered part of the POOL.

4.8.1.6.3.1 Calculating

WING WALLS and PENINSULAS shall not be accounted for in calculating the POOL perimeter.

4.8.1.6.4 Normal Operating Water Level

WING WALLS and PENINSULAS shall be at or above the normal operating water level of the POOL.

4.8.1.6.5[A] Deck Drainage

DECK drainage shall not be required for WING WALLS or PENINSULAS as they are considered part of the POOL.

4.8.1.6.5.1 Crowned

The tops shall be crowned to prevent standing water and sloped to the POOL or overflow system.

4.8.1.6.6 Vertical Depth Markers

Vertical depth markers shall be provided around WING WALLS and PENINSULAS in accordance with MAHC 4.5.19.

4.8.1.7[A] Islands

4.8.1.7.1 Minimum Width

An ISLAND not more than 18 inches *(45.7 cm)* in width shall be designed to discourage a person from walking on the ISLAND by not providing stairs, ladders, or bridges to the ISLAND.

4.8.1.7.2 Slip Resistant

The surface of ISLANDS intended for foot traffic shall be slip resistant.

4.8.1.7.3 Lifeguards

An ISLAND 18 inches *(45.7 cm)* to 48 inches *(1.2 m)* wide may be allowed for use only by QUALIFIED LIFEGUARDS.

4.8.1.7.4 Vertical Depth Markers

Vertical depth markers shall be provided around ISLANDS in accordance with MAHC 4.5.19 and visible from all sides.

4.8.1.7.5 Horizontal Depth Markers

Horizontal depth markings and warning signs shall also be required per MAHC 4.5.19 if the ISLAND is designed for BATHER use.

4.8.1.7.5.1 Islands Not Intended for Bather Use

If the ISLAND is not designed for BATHER use, warning signs stating “No Entry” shall be required.

4.8.1.7.6 Bridge or Stairway

An ISLAND designed for BATHER traffic shall be accessible by bridge, ramp, ladder, or stairway from the POOL.

4.8.1.7.7 Minimum Clearance

All bridges spanning a POOL or any other structures not intended for interactive play shall have a minimum clearance of seven feet *(2.1 m)* from the bottom of the POOL to any structure overhead.

4.8.1.7.8 Guard Rails

Any bridge shall have a minimum 42 inch *(1.1 m)* high BARRIER on both sides.

4.8.1.8[A] Heated Decks

4.8.1.8.1 Freeze Protection

Where heated DECKS are provided for the purpose of freeze protection, the extent of heated area shall minimally include the entire required PERIMETER DECK and required CIRCULATION PATH(s).

4.8.1.8.2 Clearly Delineated

Heated DECK paths must be clearly delineated with respect to un-heated DECKS.

4.8.1.9 Hose Bibbs

4.8.1.9.1 General

Domestic water hose bibbs shall be provided in sufficient quantity, spacing, and type to wash down PERIMETER DECK and POOL DECK areas using a hose of no longer than 100 feet *(30.5 m)*.

4.8.1.9.2 Backflow Prevention

All hose bibbs shall be equipped with BACKFLOW prevention devices.

4.8.2 Diving Boards and Platforms

4.8.2.1[A] Diving Envelope

4.8.2.1.1 Competitive Diving

Diving boards shall be permitted only when the diving envelope conforms to the STANDARDS of the certifying agency that regulates competitive diving at the AQUATIC FACILITY. Such certifying agencies include:

1) National Collegiate Athletic Association *(NCAA)*,
2) the National Federation of State High School Associations *(NFSHSA)*,
3) the Federation Internationale de Natation Amateur *(FINA)*, or
4) U.S.A. Diving, Inc.

4.8.2.1.2 Non-Competitive Diving

If the AQUATIC VENUE does not have competitive diving, then the diving envelope shall conform to the diving envelope STANDARDS of

1) MAHC Table 4.8.2.2,
2) MAHC Table 4.8.2.3,
3) MAHC Figure 4.8.2.2.1, and
4) MAHC Figure 4.8.2.2.2.

4.8.2.2[A] Steps and Guardrails

4.8.2.2.1 Higher than Twenty-One Inches

Diving stands higher than 21 inches *(53.3 cm)* measured from the DECK to the top of the butt end of the board or platform shall have steps or a ladder and handrails.

4.8.2.2.2 Self-Draining Treads

Steps or ladder treads shall be self-draining, corrosion resistant, non-slip, and designed to support the maximum expected load.

4.8.2.2.3 Short Platforms

Diving stands or platforms that are one meter *(3.4 ft)* or higher must be protected with guard rails at least 30 inches *(76.2 cm)* above the board, extending at least to the edge of the water along with intermediate rails.

4.8.2.2.4 Tall Platforms

Diving stands or platforms that are two meters *(6.6 ft)* or higher must have guard rails with the top rail at least 36 inches *(0.9 m)* above the board and a second rail approximately half the distance from the platform to the upper rail.

Table 4.8.2.2: Diving Board Dimensions

Board Height	1.64 ft. *(0.5 m)*	2.46 ft. *(0.75 m)*	3.28 ft. *(1.0 m)*	3.84 ft. *(3.0 m)*
Board Length	10.0 ft. *(3.05 m)*	12.0 ft. *(3.66 m)*	16.0 ft. *(4.88 m)*	16.0 ft. *(4.88 m)*
Board Width	20.0 in. *(50.8 cm)*	20.0 in. *(50.8 cm)*	20.0 in. *(50.8 cm)*	20.0 in. *(50.8 cm)*

Table 4.8.2.3: Dimensions of Components Related to Diving Wells

Letters below refer to MAHC Figures 4.8.2.2.1 & 4.8.2.2.2		***Minimum Dimensions***			
A	**Distance from plummet back to pool wall**	3.0 ft. *(0.91 m)*	4.5 ft. *(1.37 m)*	6.0 ft. *(1.83 m)*	6.0 ft. *(1.83 m)*
B	**Distance from plummet to pool wall at side**	10.0 ft. *(3.05 m)*	10.0 ft. *(3.05 m)*	10.0 ft. *(3.05 m)*	11.5 ft. *(3.51 m)*
C	**Distance from plummet to adjacent plummet**	8.83 ft. *(2.69 m)*	8.83 ft. *(2.69 m)*	8.83 ft. *(2.69 m)*	8.54 ft. *(2.60 m)*
D	**Distance from plummet to pool wall ahead**	26.0 ft. *(7.92 m)*	27.83 ft. *(8.48 m)*	29.58 ft. *(9.02 m)*	33.67 ft. *(10.26 m)*
E	**Height, board to ceiling at plummet & distances F and G**	16.0 ft. *(4.88 m)*	16.0 ft. *(4.88 m)*	16.0 ft. *(4.88 m)*	16.0 ft. *(4.88 m)*
F	**Clear overhead distance behind and each side of plummet**	8.0 ft. *(2.34 m)*	8.0 ft. *(2.34 m)*	8.0 ft. *(2.34 m)*	8.0 ft. *(2.34 m)*
G	**Clear overhead distance ahead of plummet**	16.0 ft. *(4.88 m)*	16.0 ft. *(4.88 m)*	16.0 ft. *(4.88 m)*	16.0 ft. *(4.88 m)*
H	**Depth of water at plummet**	9.5 ft. *(2.90 m)*	10.75 ft. *(3.28 m)*	12.0 ft. *(3.66 m)*	12.5 ft. *(3.81 m)*
J	**Distance ahead of plummet to depth K**	12.0 ft. *(3.66 m)*	14.25 ft. *(4.34 m)*	16.5 ft. *(5.03 m)*	19.75 ft. *(6.02 m)*
K	**Depth at distance J ahead of plummet**	8.75 ft. *(2.67 m)*	10.0 ft. *(3.05 m)*	11.28 ft. *(3.44 m)*	12.17 ft. *(3.71 m)*
L	**Distance at each side of plummet to depth M**	8.0 ft. *(2.34 m)*	8.13 ft. *(2.48 m)*	8.25 ft. *(2.51 m)*	9.92 ft. *(3.02 m)*
M	**Depth at distance L on each side of plummet**	9.08 ft. *(2.77 m)*	10.33 ft. *(3.15 m)*	11.63 ft. *(3.54 m)*	12.17 ft. *(3.71 m)*
N	**Maximum slope to reduce height E**	30°	30°	30°	30°
P	**Maximum floor slope to reduce depth ahead of K, to the sides of M, or back to pool wall behind H**	3:1	3:1	3:1	3:1

Figure 4.8.2.2.1: Diving Platform Longitudinal Section

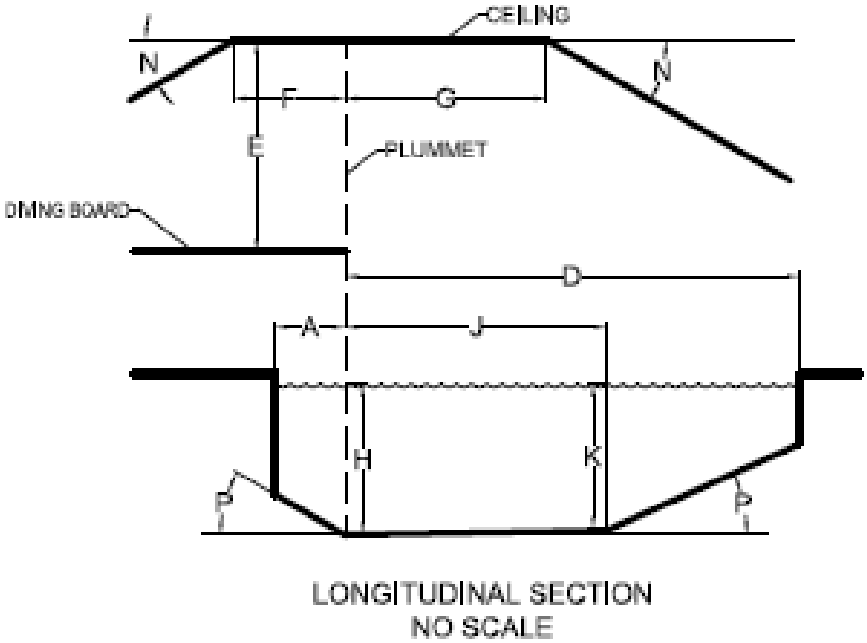
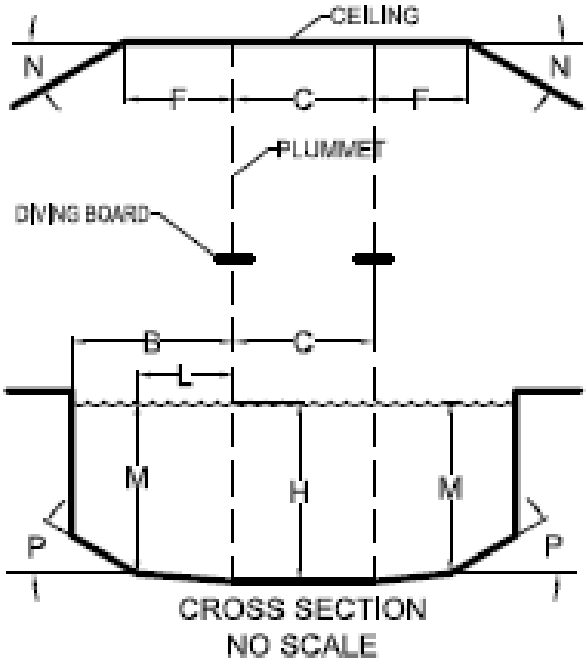


Figure 4.8.2.2.2: Diving Platform Cross Section



4.8.3 Starting Platforms

4.8.3.1[A] Conform to Standard Codes

Starting platforms shall be installed and conform to applicable SAFETY STANDARDS established by:

1) Federation Internationale de Natation *(FINA)*,
2) U.S.A. Swimming,
3) National Collegiate Athletic Association *(NCAA)*,
4) National Federation of State High Schools Associations *(NFSHSA)*,
5) YMCA, or
6) Other sanctioning body.

4.8.3.2 Minimum Water Depth

Starting platforms shall be installed in a minimum water depth of four feet *(1.2 m)*.

4.8.3.3 Leading Edge

The leading edge of starting platforms shall have a maximum height of 30 inches *(76.2 cm)* above the water surface.

4.8.3.4 Slip Resistant

Starting platforms shall have slip resistant tread surfaces.

4.8.3.5 Secure and Stable

Starting platforms shall be installed and secured per manufacturer's recommendations at all times when in use.

4.8.4 Pool Slides [N/A]

4.8.5 Lifeguard- and Safety-Related Equipment

4.8.5.1 Equipment Inspection and Maintenance [N/A]

4.8.5.2 Safety Equipment Required at all Aquatic Facilities

4.8.5.2.1[A] Emergency Communication Equipment

The AQUATIC FACILITY or each AQUATIC VENUE, as necessary, shall have a functional telephone or other communication device that is hard wired and capable of directly dialing 911 or function as the emergency notification system.

4.8.5.2.1.1 Conspicuous and Accessible

The telephone or communication system or device shall be conspicuously provided and accessible to AQUATIC VENUE users such that it can be reached immediately.

4.8.5.2.1.2 Alternate Communication Systems

Alternate systems or devices are allowed with approval of the AHJ in situations when a telephone is not logistically sound, and an alternate means of communication is available, which meet the requirements of MAHC 5.8.5.2.1.2.

4.8.5.2.1.3 Internal Communication

The AQUATIC FACILITY design shall include a method for staff to communicate in cases of emergency.

4.8.5.2.1.4 Signage

A sign shall be posted at the telephone providing dialing instructions, address and location of the AQUATIC VENUE location, and the telephone number.

4.8.5.3 Safety Equipment Required at Facilities with Lifeguards

4.8.5.3.1[A] Lifeguard Chair and Stand Placement

The designer shall coordinate with the owner and/or an aquatic consultant to consider the impact on BATHER surveillance zones for placement of chairs and stands designed to be permanently installed so as to provide an unobstructed view of the BATHER surveillance zones.

4.8.5.3.2[A] Lifeguard Chair and Stand Design

The chairs/stands must be designed:

1) With no sharp edges or protrusions;
2) With sturdy, durable, and UV resistant materials;
3) To provide enough height to elevate the lifeguard to an eye level above the heads of the BATHERS; and
4) To provide safe access and egress for the lifeguard.

4.8.5.3.3[A] UV Protection for Chairs and Stands

Where provided, permanently installed chairs/stands, where QUALIFIED LIFEGUARDS can be exposed to UV radiation, shall include protection from such UV radiation exposure.

4.8.6 Barriers and Enclosures

4.8.6.1 General Requirements

4.8.6.1.1 Enclosed

All AQUATIC FACILITIES, CHEMICAL STORAGE SPACES, and AQUATIC VENUE mechanical spaces shall be enclosed to prevent unauthorized entry.

4.8.6.1.1.1 Barriers

The ENCLOSURE may consist of any combination of building envelopes, site walls, or fencing as provided for in this section.

4.8.6.1.1.2 Patron Accessibility

BARRIERS shall be provided between CHEMICAL STORAGE SPACES, POOL, mechanical spaces, and areas accessible to the public, in accordance with local building CODES.

4.8.6.2 Construction Requirements

4.8.6.2.1[A] Discourage Climbing

BARRIERS or ENCLOSURES shall discourage climbing by preventing access to nearby structures to simplify climbing over it, such as: light poles, site furnishings, overhanging tree limbs or other obvious footholds or handholds.

4.8.6.2.1.1 Horizontal Mid-Rails

Horizontal mid-rails shall not be permitted.

4.8.6.2.1.2 Mesh Fencing

Chain-link fencing constructed of a maximum opening of 1¾ inches *(44.4 mm)* mesh shall be permitted.

4.8.6.2.2[A] Emergency Exit Paths

ENCLOSURES for AQUATIC VENUES shall not block or encumber a required emergency egress path from other structures.

4.8.6.2.2.1 Pathways

Where a required emergency egress path enters an area occupied by an outdoor AQUATIC VENUE, emergency exit pathways from the building*(s)* shall continue on DECK of least equally unencumbered width, and continue to the ENCLOSURE and through gates.

4.8.6.2.2.2 Exit Pathways

Exit pathways shall be separated with a BARRIER from AQUATIC VENUES not in operation.

4.8.6.2.2.3 Seasonal Separation

Seasonal separation may be employed at seasonally operated AQUATIC VENUES, but shall be subject to the same physical requirements of permanent BARRIERS for AQUATIC VENUES in MAHC 4.8.6.

4.8.6.2.3 Windows

Windows on a building that forms part of an ENCLOSURE around an AQUATIC VENUE shall have a maximum opening width not to exceed four inches *(10.2 cm)*.

4.8.6.2.3.1 Opened

If designed to be opened, windows shall also be provided with a non-removable screen.

4.8.6.2.4[A] Height

For the purposes of this section, height shall be measured from finished grade to the top of the BARRIER on the side outside of the BARRIER surrounding an AQUATIC VENUE.

4.8.6.2.4.1 Change in Grade

Where a change in grade occurs at a BARRIER, height shall be measured from the uppermost grade to the top of the BARRIER.

4.8.6.2.4.2 Fencing Requirements

AQUATIC FACILITY ENCLOSURES shall not be less than six feet *(1.8 m)* in height.

4.8.6.2.4.3[A] Other Barriers Not Serving as Part of an Enclosure

Except where otherwise noted, all other BARRIERS not serving as part of an AQUATIC FACILITY ENCLOSURE shall not be less than 42 inches *(1.1 m)* in height.

4.8.6.3[A] Gates and Doors

4.8.6.3.1 Self-Closing and Latching

All primary public access gates or doors serving as part of an AQUATIC FACILITY ENCLOSURE or required AQUATIC VENUE ENCLOSURE shall be self-closing and self-latching from any open position.

4.8.6.3.1.1 Locked

All gates or doors shall be capable of being locked from the exterior.

4.8.6.3.1.2 Emergency Egress

Gates or doors shall be designed in such a way that they do not prevent egress in the event of an emergency.

4.8.6.3.2 Gates

Gates shall be at least equal in height at top and bottom to the BARRIER of which they are a component.

4.8.6.3.3 Turnstiles

Turnstiles shall not form a part of an AQUATIC FACILITY ENCLOSURE.

4.8.6.3.4 Exit Gates

EXIT GATES shall be conspicuously marked on the inside of the AQUATIC VENUE or AQUATIC FACILITY.

4.8.6.3.4.1 Quantity, Location, and Width

Quantity, location, and width*(s)* for EXIT GATES shall be provided consistent with local building and fire CODES and applicable accessibility guidelines.

4.8.6.3.5 Swing Outward

EXIT GATES shall swing away from the AQUATIC VENUE ENCLOSURE except where emergency egress CODES require them to swing into the AQUATIC VENUE ENCLOSURE.

4.8.6.3.6 Absence of Local Building Codes

Where local building CODES do not otherwise govern, at least one EXIT GATE shall be required for each logical AQUATIC VENUE area including individual POOLS or grade levels or both.

4.8.6.3.7[A] Unguarded Pools

For unguarded AQUATIC VENUES, self-latching mechanisms must be located not less than 4 ½ feet *(1.4 m)* above finished grade.

4.8.6.3.7.1 Operable by Children

For unguarded AQUATIC VENUES, self-latching mechanisms shall not be operable by small children on the outside of the ENCLOSURE around the AQUATIC VENUE.

4.8.6.3.8 Other Aquatic Venues

For all other AQUATIC VENUES, EXIT GATES or doors shall be constructed so as to prevent unauthorized entry from outside of the ENCLOSURE around the AQUATIC VENUE.

4.8.6.4 Indoor Aquatic Venues

4.8.6.4.1 Enclosure

Building walls enclosing an INDOOR AQUATIC FACILITY may be designated as the AQUATIC FACILITY ENCLOSURE.

4.8.6.4.2 Securable

Indoor AQUATIC VENUES shall be securable from unauthorized entry from other building areas or the exterior.

4.8.6.4.3[A] Indoor and Outdoor Aquatic Venues

Where separate indoor and outdoor AQUATIC VENUES are located on the same site, an AQUATIC VENUE ENCLOSURE shall be provided between them.

4.8.6.4.3.1 Year-Round Operation

Exception: Where all AQUATIC VENUES are operated continuously 12 months a year on the same schedule.

4.8.6.4.4[A] Wall Separating

For a passage through a wall separating the indoor portion of an AQUATIC VENUE from an outdoor portion of the same AQUATIC VENUE, the overhead clearance of the passage to the AQUATIC VENUE floor shall be at least six feet eight inches *(2.0 m)* to any solid structure overhead.

4.8.6.5[A] Multiple Aquatic Venues

4.8.6.5.1 One Enclosure

Except as otherwise required in this CODE, one ENCLOSURE may surround multiple AQUATIC VENUES at one facility.

4.8.6.5.2 Wading Pools

WADING POOLS shall not require separation from other WADING POOLS by a BARRIER. Refer to MAHC 4.12.9 for additional guidance about WADING POOLS.

4.8.7[A] Aquatic Venue Cleaning Systems

4.8.7.1[A] No Hazard

The cleaning system provided shall not create an entanglement or suction entrapment hazard or interfere with the operation or use of the AQUATIC VENUE.

4.8.7.2 Common Cleaning Equipment

If there are multiple AQUATIC VENUES at one AQUATIC FACILITY, the AQUATIC FACILITY may use common cleaning equipment.

4.8.7.3 Integral Vacuum Systems

Use of integral vacuum systems, meaning a vacuum system that uses the main circulating pump or a dedicated vacuum pump connect to the POOL with PVC piping and terminating at the POOL with a flush-mounted vacuum port fitting, shall be prohibited.

4.8.7.4 GFCI Power

Where used, PORTABLE VACUUM cleaning equipment shall be powered by circuits having GROUND-FAULT CIRCUIT INTERRUPTERS.

4.8.7.5 Low Voltage

Any ROBOTIC CLEANERS shall utilize low voltage for all components that are immersed in the POOL water.

4.8.7.6[A] GFCI Connection

Any ROBOTIC CLEANER power supply shall be connected to a circuit equipped with a ground fault interrupter, and should not be operated using an extension cord.

4.9 Filter/Equipment Room

4.9.1 Equipment Room

4.9.1.1[A] General Requirements

4.9.1.1.1 Nonabsorbent Material

The equipment area or room floor shall be of concrete or other suitable material having a smooth slip resistant finish.

4.9.1.1.1.1 Positive Drainage

The equipment area or room floor shall have positive drainage, including a sump drain pump if necessary.

4.9.1.1.2 Floor Slope

Floors shall have a slope toward the floor drain and/or sump drain pump adequate to prevent standing water at all times.

4.9.1.1.3 Opening

The opening to the EQUIPMENT ROOM or area shall be designed to provide access for all anticipated equipment.

4.9.1.1.4 Hose Bibb

At least one hose bibb with BACKFLOW preventer shall be located in the EQUIPMENT ROOM or be accessible within an adequate distance of the EQUIPMENT ROOM so that a hose can service the entire EQUIPMENT ROOM.

4.9.1.2[A] Construction

4.9.1.2.1 Size

The size of the EQUIPMENT ROOM or area shall provide working space to perform routine operations and equipment service.

4.9.1.2.1.1 Adequate Storage Space

EQUIPMENT ROOMS also intended for STORAGE shall have adequate space provided for such STORAGE, without reducing the working spaces.

4.9.1.2.2 Lighting

EQUIPMENT ROOMS or areas shall be lighted to provide 30 foot candles *(323 lux)* of illumination at floor level in accordance with IESNA guidelines.

4.9.1.3 Electrical

4.9.1.3.1 Conform to NEC

All electrical wiring shall conform to the edition of NEC adopted by the AHJ.

4.9.1.3.2 Conform to NRTL

Equipment, components, and their application and installation shall conform to the NRTL listing.

4.9.1.4[A] Ventilation

4.9.1.4.1 Code Conformance

EQUIPMENT ROOM ventilation shall address:

1) COMBUSTION requirements,
2) Heat dissipation from equipment,
3) Humidity from surge or balance tanks,
4) Ventilation to the outside, and
5) Air quality.

4.9.1.5[A] Markings

4.9.1.5.1 Piping Identified

All piping in the EQUIPMENT ROOM shall be permanently identified by its use and the AQUATIC VENUE and AQUATIC FEATURE it serves.

4.9.1.5.1.1 Components to Identify

Identification shall be provided for:

1) Main drains and SKIMMERS,
2) Filtered water,
3) Make-up water,
4) Backwash water,
5) Chlorine *(or DISINFECTION)* feeds,
6) Acid *(or pH)* feeds,
7) Compressed air lines,
8) Gutters,
9) Chemical sample piping, and
10) POOL heating lines.

4.9.1.5.2 Piping Marked

All piping shall be marked with directional arrows as necessary to determine flow direction.

4.9.1.5.3 Valves Identified

All valves shall be clearly identified by number with a brass tag, plastic laminate tags, or permanently affixed alternate.

4.9.1.5.3.1 Valves Described

Valves shall be described as to their function and referenced in the operating instruction manual.

4.9.1.5.3.2 Piping Diagram

A water-resistant, easily read, wall-mounted piping diagram shall be furnished and installed inside the EQUIPMENT ROOM.

4.9.1.6[A] Equipment Rooms Containing Combustion Equipment [N/A]

See Annex Language for more information.

4.9.1.7[A] Separation from Chemical Storage Spaces

4.9.1.7.1 Equipment

4.9.1.7.1.1[A] Contaminated Air

Combustion equipment, air-handling equipment, and electrical equipment shall not be exposed to air contaminated with CORROSIVE chemical fumes or vapors.

4.9.1.7.1.2[A] Equipment Restrictions

Spaces containing combustion equipment, air handling equipment, and/or electrical equipment and spaces sharing air distribution with spaces containing such equipment shall not be used as CHEMICAL STORAGE SPACES at the same time.

4.9.1.7.1.2.1 Listed and Labeled

Exception: Equipment listed and labeled for use in that atmosphere shall be acceptable, where approved by the AHJ.

4.9.1.7.1.3[A] Isolated

Spaces containing combustion equipment, air-handling equipment, and/or electrical equipment and spaces sharing air distribution with spaces containing such equipment shall be isolated from CHEMICAL STORAGE SPACE air.

4.9.1.7.2 Doors and Openings

4.9.1.7.2.1[A] Between Equipment and Chemical Storage

A door or doors shall not be installed in a wall between such EQUIPMENT ROOMS and an interior CHEMICAL STORAGE SPACE.

4.9.1.7.2.2[A] No Openings

There shall be no ducts, grilles, pass-throughs, or other openings connecting such EQUIPMENT ROOMS to CHEMICAL STORAGE SPACES, except as permitted by the fire CODE.

4.9.1.7.2.3[A] Indoor Aquatic Facility Air

Spaces containing combustion equipment, air-handling equipment, and/or electrical equipment and spaces sharing air distribution with spaces containing such equipment shall be isolated from INDOOR AQUATIC FACILITY air.

4.9.1.7.2.3.1 Listed Equipment

Exception: Equipment listed for the atmosphere shall be acceptable.

4.9.1.7.2.4[A] No Openings

There shall be no ducts, grilles, pass-throughs, or other openings connecting such spaces to an INDOOR AQUATIC FACILITY.

4.9.1.7.2.4.1 Air Handlers

Ducts which connect the INDOOR AQUATIC FACILITY to the duct connections of air handlers shall not be construed as connecting the air-handler space to the INDOOR AQUATIC FACILITY.

4.9.1.7.2.4.2 HVAC Equipment

Exception: HVAC equipment which is rated for INDOOR AQUATIC FACILITY atmosphere and which serves only that INDOOR AQUATIC FACILITY shall be acceptable.

4.9.1.7.2.5[A] Openings / Gaps

Where building construction leaves any openings or gaps between floors and walls, or between walls and other walls, or between walls and ceilings, such gaps shall be permanently sealed against air leakage.

4.9.1.7.3 Indoor Aquatic Facility Access

4.9.1.7.3.1[A] Floor Slope

Where a door or doors must be installed in a wall between an EQUIPMENT ROOM and an INDOOR AQUATIC FACILITY, the floor of the EQUIPMENT ROOM shall slope per local building requirements back into the EQUIPMENT ROOM in such a way as to prevent any equipment-room spills from running under the door into the INDOOR AQUATIC FACILITY.

4.9.1.7.3.1.1 Four Inches

Exception: This requirement may be met by a floor all of which is at least 4 inches *(10.2 cm)* below the level of the nearest part of the INDOOR AQUATIC FACILITY floor.

4.9.1.7.3.1.2 Dike

Exception: This requirement may be met by a continuous dike not less than four inches *(10.2 cm)* high located entirely within the EQUIPMENT ROOM, which will prevent spills from reaching the INDOOR AQUATIC FACILITY floor.

4.9.1.7.3.1.3 Floor Drains

Equipment-room floor drains may be required by the AHJ.

4.9.1.7.3.2[A] Automatic Closer

Such door or doors between an EQUIPMENT ROOM and an INDOOR AQUATIC FACILITY shall be equipped with an automatic closer.

4.9.1.7.3.2.1 Maintained to Close Reliably

The door, frame, and automatic closer shall be installed and maintained so as to ensure that the door closes completely and latches without human assistance.

4.9.1.7.3.3[A] Automatic Lock

Such door or doors between an EQUIPMENT ROOM and an INDOOR AQUATIC FACILITY shall be equipped with an automatic lock.

4.9.1.7.3.3.1[A] Restrict Access

Such lock shall require a key or combination to open from the INDOOR AQUATIC FACILITY side.

4.9.1.7.3.3.2 One Hand

Such lock shall be so designed and installed as to be opened by one hand from the inside of the room under all circumstances, without the use of a key or tool.

4.9.1.7.3.4 Warning Sign

Such doors shall be equipped with permanent signage warning against unauthorized entry.

4.9.1.7.3.5 Gasket

All sides of such doors shall be equipped with a gasket.

4.9.1.7.3.5.1 Prevent Air Passage

The gasket shall be so installed as to prevent the passage of air, fumes, or vapors when the door is closed.

4.9.1.7.3.6 Not Relief

This section shall not be construed as granting relief from MAHC 4.9.1.7.2.1.

4.9.1.8 Other Equipment Room Guidance

4.9.1.8.1[A] Access Space

Where ventilation, air filtration, or space dehumidification, heating, or cooling for an INDOOR AQUATIC FACILITY is by mechanical equipment located in an EQUIPMENT ROOM, adequate access space shall be provided to allow for inspection and service.

4.9.1.8.1.1[A] Size Requirements

The access spaces shall be the greater of:

1) Those required by OSHA, NEC, National Fuel Gas Code, or other official requirements; or
2) The equipment-manufacturers' recommendations.

4.9.1.8.2[A] Adequate Space

Where ventilation, air filtration, or space heating or cooling for an INDOOR AQUATIC FACILITY is beside mechanical equipment located in an EQUIPMENT ROOM, adequate space for required straight lengths of duct shall be provided as the greater of those described in AMCA 201, SMACNA Duct Manual, ACCA Manual SPS Sec. 13, or the equipment manufacturer's recommendations.

4.9.1.8.3[A] Minimize Hazards

Where an EQUIPMENT ROOM contains equipment requiring regular service or maintenance, the room shall be so designed and constructed as to minimize the hazards of such maintenance and service.

4.9.1.8.3.1 Ladder Installed

Where a ladder will be required for service or maintenance of equipment, other permanently installed equipment shall not be so located as to interfere with the use of the ladder.

4.9.1.8.3.2 Alternative Access

Where a ladder cannot be safely or practically used to service equipment where any serviceable component is more than 6.5 feet *(2.0 m)* above the floor, a mezzanine floor, platform, or other arrangement for safe access shall be provided.

4.9.1.8.3.2.1 Exception

Exception: Where otherwise specifically allowed by OSHA.

4.9.1.8.3.2.2 Stricter Requirements

Exception: Where OSHA or other applicable CODES or STANDARDS have stricter requirements, those stricter requirements shall prevail.

4.9.1.8.4[A] Refrigeration Equipment

Where refrigeration equipment such as an air-conditioner or dehumidifier is located indoors in a building intended for occupation, arrangements for refrigerant relief *(if any)* shall be according to the applicable mechanical CODE or other applicable CODE.

4.9.2[A] Chemical Storage Spaces

Nothing in this section shall be construed as providing relief from applicable requirements of fire CODES, mechanical CODES, electrical CODES, etc.

4.9.2.1 Outdoor / Indoor Storage

4.9.2.1.1 Stored Outdoors

If POOL chemicals, acids, salt, oxidizing cleaning materials, or other CORROSIVE or oxidizing chemicals are STORED outdoors, they shall be stored in a well-ventilated protective area with an installed BARRIER to prevent unauthorized access as per MAHC 4.9.2.3.

4.9.2.1.2 Minimize Vapors

Where such materials must be stored in a building intended for occupancy, the transfer of chemical fumes and vapors from the CHEMICAL STORAGE SPACE to other parts of the building shall be minimized.

4.9.2.1.3[A] Dedicated Space

At least one space dedicated to CHEMICAL STORAGE SPACE shall be provided to allow safe STORAGE of the chemicals present.

4.9.2.1.4[A] Eyewash

In all CHEMICAL STORAGE SPACES in which POOL chemicals will be STORED, an emergency eyewash station shall be provided.

4.9.2.1.4.1[A] AHJ Requirements

If more stringent requirements are dictated by the AHJ, then those shall govern and be applicable.

4.9.2.2[A] Construction

4.9.2.2.1 Foreseeable Hazards

The construction of the CHEMICAL STORAGE SPACE shall take into account the foreseeable hazards.

4.9.2.2.2 Protected

The construction of the CHEMICAL STORAGE SPACE shall, to the extent practical, protect the STORED materials against tampering, wild fires, unintended exposure to water, etc.

4.9.2.2.3[A] Floor

The floor or DECK of the CHEMICAL STORAGE SPACE shall be protected against substantial chemical damage.

4.9.2.2.4 Minimize Fumes

The construction and operation of a CHEMICAL STORAGE SPACE shall minimize the transfer of chemical fumes into any INTERIOR SPACE of a building intended for occupation.

4.9.2.2.5 Surfaces

Any walls, floors, doors, ceilings, and other building surfaces of an interior CHEMICAL STORAGE SPACE shall join each other tightly.

4.9.2.2.6[A] No Openings

There shall be no permanent or semi-permanent opening between a CHEMICAL STORAGE SPACE and any other INTERIOR SPACE of a building intended for occupation unless compliant with MAHC 4.9.2.4.3, 4.9.2.4.4. and 4.9.2.4.5.

4.9.2.3[A] Exterior Chemical Storage Spaces

4.9.2.3.1 Outdoor Equipment

Equipment listed for outdoor use may be located in an exterior CHEMICAL STORAGE SPACES as permitted.

4.9.2.3.2[A] Fencing

Exterior CHEMICAL STORAGE SPACES not joined to a wall of a building shall be completely enclosed by fencing that is at least six feet *(1.8 m)* high and meets the non-climbability requirements of MAHC 4.8.6.2.1.

4.9.2.3.3 Gate

Fencing shall be equipped with a self-closing and self-latching gate having a permanent locking device.

4.9.2.4[A] Chemical Storage Space Doors

4.9.2.4.1[A] Signage

All doors opening into CHEMICAL STORAGE SPACES shall be equipped with permanent signage:

1) Warning against unauthorized entry, and
2) Specifying the expected hazards, and
3) Specifying the location of the associated SDS forms, and
4) Product chemical hazard NFPA chart.

4.9.2.4.2[A] Emergency Egress

Where a single door is the only means of egress from a CHEMICAL STORAGE SPACE, the door shall be equipped with an emergency-egress device.

4.9.2.4.3[A] Interior Door

Where a CHEMICAL STORAGE SPACE door must open to an INTERIOR SPACE, spill containment shall be provided to prevent spilled chemicals from leaving the CHEMICAL STORAGE SPACE.

4.9.2.4.4[A] Equipment Space

Where a CHEMICAL STORAGE SPACE door must open to an INTERIOR SPACE, the door shall not open to a space containing combustion equipment, air-handling equipment, or electrical equipment.

4.9.2.4.4.1[A] Corrosive

Such door shall be acceptable where all equipment thus exposed is listed for the CORROSIVE atmosphere.

4.9.2.4.5 Interior Opening

Where a CHEMICAL STORAGE SPACE door must open to an INTERIOR SPACE, such door shall have all of the following requirements outlined from MAHC 4.9.2.4.5.1 to 4.9.2.4.5.7.2.

4.9.2.4.5.1 Corrosion-Resistant

Such doors shall be constructed of corrosion-resistant materials.

4.9.2.4.5.2[A] Automatic Lock

Such doors shall be equipped with a corrosion-resistant, automatic lock to prevent unauthorized entry.

4.9.2.4.5.2.1 Key or Combination

Such lock shall require a key or combination to open from the outside into the CHEMICAL STORAGE SPACE.

4.9.2.4.5.2.2 Opened

Such lock shall be so designed and installed as to be capable of being opened by one hand from the inside of the CHEMICAL STORAGE SPACE without the use of a key or tool.

4.9.2.4.5.3 Supported

Such doors shall be supported on corrosion-resistant hinges, tracks, or other supports.

4.9.2.4.5.4 Air Leakage

Such doors shall be equipped with suitable gaskets or seals on the top and all sides to minimize air leakage between the door and the door frame.

4.9.2.4.5.5 Floor

Such doors shall be equipped with a floor or threshold seal to minimize air leakage between the door and the floor or threshold.

4.9.2.4.5.6 Automatic Closer

Such doors shall be equipped with an automatic door closer that will completely close the door and latch without human assistance.

4.9.2.4.5.6.1 Air Pressure

The door closer shall be able to close the door completely against the specified difference in air pressure.

4.9.2.4.5.7 Limit Switch

Such doors shall be equipped with a limit switch and an alarm that will sound if the door remains open for more than 30 minutes.

4.9.2.4.5.7.1 Alarm

This alarm shall have a minimum output level of 85 dbA at ten feet *(3.0 m)*.

4.9.2.4.5.7.2 Loss of Air Pressure

Where an open door will result in loss of air-pressure difference, this requirement can be met by the audible alarm required under MAHC 4.9.2.5.2.4.

4.9.2.5[A] Interior Chemical Storage Spaces

4.9.2.5.1[A] No Air Movement

There shall be no transfer grille, pass-through grille, louver, or other device or opening that will allow air movement from the CHEMICAL STORAGE SPACE into any other INTERIOR SPACE of a building intended for occupancy or into another CHEMICAL STORAGE SPACE.

4.9.2.5.2[A] Electrical Conduit System

Interior CHEMICAL STORAGE SPACES that share any building surface *(wall, floor, ceiling, door, etc.)* with any other INTERIOR SPACE shall be equipped with a ventilation system that operates continuously and insures that all air movement is from all other INTERIOR SPACES and toward the CHEMICAL STORAGE SPACE.

4.9.2.5.2.1 Additional Interior Space

Interior CHEMICAL STORAGE SPACES that share an electrical conduit system with any other INTERIOR SPACE shall be equipped with a ventilation system that operates continuously and insures that all air movement is from all other INTERIOR SPACES and toward the CHEMICAL STORAGE SPACE.

4.9.2.5.2.2[A] Pressure Difference

This pressure difference shall be maintained by a continuously operated exhaust system used for no other purpose than to remove air from that one CHEMICAL STORAGE SPACE.

4.9.2.5.2.3 Separate Exhaust System

Where more than one CHEMICAL STORAGE SPACE is present, a separate exhaust system shall be provided for each CHEMICAL STORAGE SPACE.

4.9.2.5.2.3.1 Airflow Rate

The exhaust airflow rate shall be the greater of the:

1) OSHA requirements for working in such enclosed spaces, or
2) Amount needed to maintain the concentration of vapors or fumes below the PEL for the expected exposure time *(defined by 29 CFR 1910.1000 (OSHA))* for each stored chemical, or
3) Amount specified by International Mechanical Code, or
4) Amount specified by the Uniform Mechanical Code, or
5) Amount needed to maintain the specified pressure difference.

4.9.2.5.2.4[A] Alarm

The function of this exhaust system shall be monitored continuously by an audible differential-pressure alarm system which shall sound if the specified differential air pressure is not maintained for a period of thirty minutes.

4.9.2.5.2.4.1 Minimum Output

This alarm shall have a minimum output level of 85 dbA at ten feet *(3.0 m)*.

4.9.2.5.2.4.2 Manual Reset

The specified alarm shall require manual reset to silence it.

4.9.2.6 Air Ducts in Interior Chemical Storage Spaces

4.9.2.6.1[A] No Air Movement

No duct shall allow air movement from the CHEMICAL STORAGE SPACE into any other INTERIOR SPACE of a building intended for occupation or into any other CHEMICAL STORAGE SPACE.

4.9.2.6.2 Chemical Storage

Air ducts shall not enter or pass through an interior CHEMICAL STORAGE SPACE.

4.9.2.6.2.1 Corrosion-Resistant

Exception: A corrosion-resistant duct used for no other purpose than to exhaust air from the CHEMICAL STORAGE SPACE shall be acceptable.

4.9.2.6.2.1.1 Building Exterior

This corrosion-resistant duct must exhaust to the exterior and must end at a point on the exterior of the building, at least 20 feet *(6.1 m)* from any air intake for breathing air, cooling air, or combustion air.

4.9.2.6.2.2 Makeup Air

Exception: A duct used for no other purpose than to supply makeup air to the CHEMICAL STORAGE SPACE shall be acceptable.

4.9.2.6.2.2.1 Building Exterior

This makeup air supply duct must end at a point on the exterior of the building, at least 20 feet *(6.1 m)* from any air intake for breathing air, cooling air, or combustion air.

4.9.2.6.2.3 Other Ducts

Exception: Any other ducts specifically allowable by applicable building and mechanical CODES where such ducts are corrosion-resistant and joint-free to the extent feasible shall be acceptable.

4.9.2.7 Pipes and Tubes in Interior Chemical Storage Spaces

4.9.2.7.1 Not Enter

Pipes and tubes shall not enter or pass through an interior CHEMICAL STORAGE SPACE.

4.9.2.7.1.1 Service

Exception: As required to service devices integral to the function of the CHEMICAL STORAGE SPACE, such as pumps, vessels, controls, freeze protection, and SAFETY devices.

4.9.2.7.1.2 Automatic Fire Suppression

Exception: As required to allow for automatic fire suppression where required.

4.9.2.7.1.3 Drainage

Exception: As required for drainage.

4.9.2.7.2 Devices

Piping, tubes, drain bodies, grates, and attachment and restraint devices shall be corrosion-resistant and rated for the chemical environment*(s)* present including floor drain bodies and grates.

4.9.2.7.3 Wall Penetrations

All wall penetrations shall be sealed air-tight.

4.9.2.7.3.1 Rating

All wall penetrations shall be commensurate with the rating of the wall assembly.

4.9.2.7.3.2 Sealing Materials

Sealing material*(s)* shall be compatible with the wall assembly and the chemical environment*(s)* present.

4.9.2.8[A] Combustion Equipment in Interior Chemical Storage Spaces

4.9.2.8.1 Installed

No COMBUSTION DEVICE or appliance shall be installed in a CHEMICAL STORAGE SPACE, or in any other place where it will be exposed to the air from a CHEMICAL STORAGE SPACE.

4.9.2.8.1.1 Exception

Exception: A COMBUSTION DEVICE or appliance which meets all of the following requirements shall be acceptable:

1) The device or appliance is required for one or more processes integral to the function of the room, such as space heat; and
2) The device is listed for such use; and
3) The device as installed is acceptable to the AHJ.

4.9.2.9 Electrical Equipment in Chemical Storage Spaces

Electrical equipment and wiring methods used for or in CHEMICAL STORAGE SPACES shall comply with MAHC 4.9.2.

4.9.2.10 Ozone Rooms

4.9.2.10.1 Only Ozone Equipment

An ozone EQUIPMENT ROOM shall not be used for STORAGE of chemicals, solvents, or any combustible materials, other than those required for the operation of the recirculation and ozone generating equipment.

4.9.2.10.2 Emergency Ventilation

Rooms which are designed to include ozone equipment shall be equipped with an emergency ventilation system capable of six air changes per hour.

4.9.2.10.2.1 Exhaust Intake

The exhaust intake shall be located approximately 6 inches *(15.2 cm)* from the floor, on the opposite side of the room from the make-up air intake.

4.9.2.10.2.2 On Command

The emergency ventilation system shall be so arranged as to run on command of an ozone-leak alarm or on command of a manual switch.

4.9.2.10.2.3 Manual Switch

The manual emergency ventilation switch shall be located outside the room and near the door to the ozone room.

4.9.2.10.3 Below Grade

Ozone rooms which are below grade shall be equipped with forced-draft ventilation capable of six air changes per hour.

4.9.2.10.3.1 Exhaust Intake

The exhaust intake shall be located approximately 6 inches *(15.2 cm)* from the floor, on the opposite side of the room from the make-up air intake.

4.9.2.10.3.2 Arranged

Such ventilation system shall be so arranged as to:

1) Run automatically concurrent with the ozone equipment and for at least a time allowing for 15 air changes after the ozone equipment is stopped,
2) Run upon activation of the ozone detection and alarm system, and
3) Run on command of a manual switch.

4.9.2.10.3.3 Manual Ventilation Switch

The manual ventilation switch shall be located outside the room and near the door to the ozone room.

4.9.2.10.4 Signage

In addition to the signs required on all CHEMICAL STORAGE AREAS, a sign shall be posted on the exterior of the entry door, stating “DANGER - GASEOUS OXIDIZER – OZONE” in lettering not less than four inches *(10.2 cm)* high.

4.9.2.10.5 Alarm System

Rooms containing ozone generation equipment shall be equipped with an audible and visible ozone detection and alarm system.

4.9.2.10.5.1 Requirements

The alarm system shall consist of both an audible alarm capable of producing at least 85 decibels at ten feet distance *(3.0 m)*, and a visible alarm consisting of a flashing light mounted in plain view of the entrance to the ozone-EQUIPMENT ROOM.

4.9.2.10.5.2 Sensor

The ozone sensor shall be located at a height of 18-24 inches *(45.7-61.0 cm)* above floor level.

4.9.2.10.5.2.1 Measuring

The ozone sensor shall be capable of measuring ozone in the range of 0-2 ppm.

4.9.2.10.5.3 Ozone Concentration

The alarm system shall alarm when the ozone concentration equals or exceeds 0.1 ppm in the room.

4.9.2.10.5.4 Activation

Activation of the alarm system shall shut off the ozone generating equipment and turn on the emergency ventilation system.

4.9.2.11[A] Gaseous Chlorination Space

As per MAHC 4.7.3.2.4.1, use of compressed CHLORINE gas shall be prohibited for new construction and after SUBSTANTIAL ALTERATION to existing AQUATIC FACILITIES.

4.9.2.11.1 Existing Facilities

MAHC 4.9.2.11 shall apply to existing facilities using compressed CHLORINE gas.

4.9.2.11.2 Adequate Size

A gaseous-chlorination space shall be large enough to house the chlorinator, CHLORINE STORAGE tanks, and associated equipment as required.

4.9.2.11.3 Secure Tanks

A gaseous-chlorination space shall be equipped with facilities for securing tanks.

4.9.2.11.4 Not Below Grade

A gaseous-chlorination space shall not be located in a basement or otherwise be below grade.

4.9.2.11.5 Compressed-Chlorine Gas

Where installed indoors, compressed-CHLORINE gas STORAGE containers and associated chlorinating equipment shall be in a separate room constructed to have a fire rating of not less than 1-hour.

4.9.2.11.6 Entry Door

The entry door to an indoor gaseous-CHLORINE space shall open to the exterior of the building or structure.

4.9.2.11.6.1 Pool or Deck

The entry door to an indoor gaseous-CHLORINE space shall not open directly towards a POOL or DECK.

4.9.2.11.7 Inspection Window

An indoor gaseous-CHLORINE space shall be provided with a shatterproof gas-tight inspection window.

4.9.2.11.8 Ventilation

Indoor gaseous-chlorination spaces shall be provided with a spark-proof ventilation system capable of 60 air changes per hour.

4.9.2.11.8.1 Exhaust-Air Intake

The exhaust-air intake of the ventilation system shall be taken at a point within 6 inches *(15.2 cm)* of the floor, and on the opposite side of the room from the makeup-air intake.

4.9.2.11.8.2 Discharge Point

The exhaust-air discharge point shall be:

1) Outdoors, and
2) Above adjoining grade level, and
3) At least 20 feet *(6.1 m)* from any operable window, and
4) At least 20 feet *(6.1 m)* from any adjacent building.

4.9.2.11.8.3 Make-Up Intake

The make-up air intake shall be within 6 inches *(15.2 cm)* of the ceiling of the space.

4.9.2.11.8.3.1 Open Outdoors

The make-up air intake shall open directly to the outdoors.

4.9.2.11.8.4 Personal Protective Equipment Available

PPE, consisting of at least a gas mask approved by NIOSH for use with CHLORINE atmospheres, shall be stored directly outside one entrance to an indoor gaseous-chlorination space.

4.9.2.11.8.5 SCBA Systems

A minimum of two SCBA systems shall be on hand at all times and two QUALIFIED OPERATORS are to be involved in the changing of the tanks.

4.9.2.11.8.6 Stationed Outside

One of the QUALIFIED OPERATORS should be stationed outside of the chemical room where the QUALIFIED OPERATOR inside can be seen at all times.

4.9.2.11.8.7 Emergency Telephone

An emergency direct line telephone shall be located by the door.

4.9.2.12 Windows in Chemical Storage Spaces

4.9.2.12.1[A] Not Required

Windows in CHEMICAL STORAGE SPACES shall not be required by this CODE.

4.9.2.12.2[A] Requirements

Where a window is to be installed in an interior wall, ceiling, or door of a CHEMICAL STORAGE SPACE, such window shall have the following components:

1) Tempered or plasticized glass,
2) A corrosion-resistant frame, and
3) Incapable of being opened or operated.

4.9.2.12.3 Exterior Window

Any CHEMICAL STORAGE SPACE window in an exterior wall or ceiling shall:

1) Be mounted in a corrosion-resistant frame, and
2) Be so protected by a roof, eave, or permanent awning as to minimize the entry of rain or snow in the event of window breakage.

4.9.2.13 Sealing and Blocking Materials

4.9.2.13.1 Minimize Leakage

Materials used for sealing and blocking openings in an interior CHEMICAL STORAGE SPACE shall minimize the leakage of air, vapors, or fumes from the CHEMICAL STORAGE SPACE.

4.9.2.13.2 Compatible

Materials used for sealing and blocking openings in an interior CHEMICAL STORAGE SPACE shall be compatible for use in the environment.

4.9.2.13.3 Fire Rating

Materials used for sealing and blocking openings in an interior CHEMICAL STORAGE SPACE shall be commensurate with the fire rating of the assembly in which they are installed.

4.10 Hygiene Facilities

4.10.1[A] General

4.10.1.1 New Construction or Substantial Alteration

All design provisions shall be required for new construction or SUBSTANTIAL ALTERATION to an existing AQUATIC FACILITY.

4.10.1.1.1 At Time of Adoption

Exception: the following MAHC sections shall be required for all AQUATIC FACILITIES at time of adoption or within one year of adoption as stated:

1) MAHC 4.10.4.5: Diaper-changing stations,
2) MAHC 4.10.4.6.5: Soap Dispensers, and
3) MAHC 4.10.4.6.9: Trash Can

4.10.1.2[A] Minimum to Provide

AQUATIC FACILITIES shall provide HYGIENE FACILITIES that include, at a minimum, toilets, urinals, SHOWERS, DIAPER-CHANGING STATIONS, and other HYGIENE FIXTURES, as specified herein.

4.10.1.3 Construction

HYGIENE FACILITIES shall be constructed in accordance with applicable state and local CODES or as modified herein.

4.10.1.4 Minimum Toilets, Urinals, and Other Fixtures

The minimum number of toilets, urinals, and other HYGIENE FIXTURES provided, excluding SHOWERS, shall be the greater of the following two options:

1) In accordance with applicable state and local CODES, or
2) Based upon maximum theoretical peak occupancy of each aquatic venue.

4.10.1.5[A] Theoretical Peak Occupancy

THEORETICAL PEAK OCCUPANCY for all AQUATIC VENUES shall be calculated as defined in MAHC 4.1.2.3.5.3.

4.10.2 Location

4.10.2.1[A] Distance

Except as required in MAHC 4.10.2.2, a drinking fountain, toilet, HAND WASH STATION, and DIAPER-CHANGING STATION shall be located no greater than 300 feet *(91 m)* walking distance from each AQUATIC VENUE.

4.10.2.2[A] Children Less than Five Years of Age

An AQUATIC VENUE designed primarily for use by children less than five years of age shall have a drinking fountain, toilet, HAND WASH STATION, and DIAPER-CHANGING STATION located no greater than 200 feet *(61 m)* walking distance and in clear view from the nearest entry/exit of the AQUATIC VENUE.

4.10.3[A] Design and Construction

4.10.3.1 Floors

The floors of HYGIENE FACILITIES and dressing areas serving AQUATIC FACILITIES shall have a smooth, easy-to-clean, impervious-to-water, slip-resistant surface.

4.10.3.1.1 Coefficient of Friction

All surfaces required to be slip-resistant shall have a minimum dynamic coefficient of friction at least equal to the requirements of ANSI A137.1-2012 for that installation as measured by the DCOF AcuTest.

4.10.3.2[A] Floor Base

A hard, smooth, impervious-to-water, easy-to-clean base shall provide a sealed, coved juncture between the wall and floor and extend upward on the wall at least six inches *(15.2 cm)*.

4.10.3.3 Floor Drains

Floor drains shall be installed in HYGIENE FACILITIES and dressing areas where PLUMBING FIXTURES are located.

4.10.3.3.1[A] Opening Grill Covers

Floor drain opening grill covers shall be ½-inch *(1.3 cm)* or less in width or diameter.

4.10.3.3.2[A] Sloped to Drain

Floors shall be sloped to drain water or other liquids.

4.10.3.3.2.1 Accessible Routes

Where DECK areas serve as ACCESSIBLE ROUTES or portions thereof, slopes in any direction shall not exceed ADA Standards and MAHC 4.8.1.3.1.

4.10.3.4 Partitions and Enclosures

Partitions and ENCLOSURES adjacent to HYGIENE FACILITIES shall have a smooth, easy-to-clean, impervious surface.

4.10.3.5[A] Hose Bibb

At least one hose bibb or other potable water source capable of connecting a hose shall be located in each HYGIENE FACILITY to facilitate cleaning.

4.10.4[A] Plumbing Fixture Requirements

4.10.4.1 General

4.10.4.1.1[A] Protected

PLUMBING FIXTURES shall be installed and operated in a manner to adequately protect the potable water supply from back siphonage or BACKFLOW in accordance with local, state or federal regulation.

4.10.4.1.2 Easily Cleaned

PLUMBING FIXTURES shall be designed so that they may be readily and frequently cleaned, SANITIZED, and disinfected.

4.10.4.1.3[A] Toilet Counts

Total toilet or urinal counts shall be in accordance with applicable state and local CODES or as modified herein.

4.10.4.1.4 Hand Wash Sink

Hand wash sink counts shall be in accordance with applicable state and local CODES or as modified herein.

4.10.4.2[A] Cleansing Showers

4.10.4.2.1[A] Count

The minimum number of CLEANSING SHOWERS shall be one per sex for AQUATIC FACILITIES less than 4000 square feet *(372 m^2)* in collective AQUATIC VENUE surface area.

4.10.4.2.1.1 Additional Cleansing Showers

An additional CLEANSING SHOWER per sex shall be added for each additional 4000 square feet *(372 m^2)* of AQUATIC VENUE space or portion thereof.

4.10.4.2.2 Distributed

CLEANSING SHOWERS shall be evenly distributed between sexes, as applicable.

4.10.4.2.3[A] Location

CLEANSING SHOWERS shall be located in a HYGIENE FACILITY near the entrance and within clear view of the AQUATIC VENUE.

4.10.4.2.4[A] Enclosed

Entryways to private or group CLEANSING SHOWER areas shall be enclosed by a door or curtain.

4.10.4.2.4.1 Doors

SHOWER doors shall be of a smooth, hard, easy-to-clean material.

4.10.4.2.4.2 Curtains

SHOWER curtains shall be of a smooth, easy-to-clean material.

4.10.4.2.5 Soap Dispenser

CLEANSING SHOWERS shall be supplied with soap and a soap dispenser adjacent to the SHOWER.

4.10.4.2.6[A] Exemption

AQUATIC VENUES located in lodging and residential settings shall be exempt from MAHC 4.10.4.2.

4.10.4.3[A] Rinse Showers

4.10.4.3.1 Minimum and Location

A minimum of one RINSE SHOWER shall be provided on the DECK near an entry point to the AQUATIC VENUE.

4.10.4.3.2 Temperature

Water used for RINSE SHOWERS may be at ambient temperature.

4.10.4.3.3[A] Floor Sloped

Floors of RINSE SHOWERS shall be sloped to drain wastewater away from the AQUATIC VENUE and meet local applicable CODES.

4.10.4.3.4[A] Large Aquatic Facilities

RINSE SHOWERS in AQUATIC FACILITIES greater than 7500 square feet *(697 m^2)* of water surface area shall be situated adjacent to each AQUATIC VENUE entry point or arranged to encourage BATHERS to use the RINSE SHOWER prior to entering the AQUATIC VENUE.

4.10.4.3.5[A] Beach Entry

A minimum of four showerheads per 50 feet *(15.2 m)* of beach entry AQUATIC VENUES shall be provided as a RINSE SHOWER.

4.10.4.3.6[A] Lazy River

A minimum of one RINSE SHOWER shall be provided at each entrance to a LAZY RIVER AQUATIC VENUE.

4.10.4.3.7[A] Waterslide

A minimum of one RINSE SHOWER shall be provided at each entrance to a WATERSLIDE queue line.

4.10.4.4[A] All Showers

AQUATIC FACILITIES with 7500 square feet *(697 m^2)* of water area or more may be flexible in the number of CLEANSING SHOWERS they provide based on the THEORETICAL PEAK OCCUPANCY in MAHC 4.1.2.3.5:

1) 25% of the required SHOWERS shall be CLEANSING SHOWERS,
2) 25% of the required SHOWERS shall be RINSE SHOWERS, and
3) the remaining 50% may be either cleansing or RINSE SHOWERS.

4.10.4.5[A] Diaper-Changing Stations

4.10.4.5.1 Each Facility

All AQUATIC FACILITIES allowing use by DIAPER-AGED BATHERS shall, upon adoption of this CODE, have at least one DIAPER-CHANGING STATION in each male and female HYGIENE FACILITY or make available a unisex DIAPER-CHANGING STATION.

4.10.4.5.1.1[A] Hand Wash Sink

For existing AQUATIC FACILITIES, the adjacent plumbed hand wash sink shall be installed and operational within one year from the date of the AHJ's adoption of the MAHC.

4.10.4.5.1.2[A] Portable

For existing AQUATIC FACILITIES that do not yet have an adjacent plumbed hand wash sink as specified in MAHC 4.10.4.5.1.1, a portable HAND WASH STATION shall be available adjacent to the station at all times.

4.10.4.5.2[A] Conform

DIAPER-CHANGING UNITS shall conform to either of the following STANDARDS:

1) ASTM Standard F2285-04: *Consumer Performance Standards for Commercial Diaper-Changing Stations*, or
2) The STANDARDS for diaper-changing surfaces in the most current version of *Caring for Our Children: National Health and Safety Performance Standards: Guidelines for Out-of-Home Child Care Programs*.

4.10.4.5.3[A] Unisex

If only a unisex HYGIENE FACILITY is provided, it must have a DIAPER-CHANGING STATION that conforms to MAHC 4.10.4.5.

4.10.4.5.4[A] Trash Can

A covered, hands-free, plastic-lined trash receptacle or diaper pail shall be located directly adjacent to the DIAPER-CHANGING UNIT.

4.10.4.5.5 Disinfecting Surface

An EPA-REGISTERED DISINFECTANT shall be provided for maintaining a clean and disinfected DIAPER-CHANGING UNIT surface before and after each use.

4.10.4.6 Non-Plumbing Fixture Requirements

4.10.4.6.1 Easy to Clean

All HYGIENE FIXTURES and appurtenances in the dressing area shall have a smooth, hard, easy-to-clean, impervious-to-water surface and be installed to permit thorough cleaning.

4.10.4.6.2 Glass

Glass, excluding mirrors, shall not be permitted in HYGIENE FACILITIES.

4.10.4.6.3 Mirrors

Mirrors shall be shatter resistant.

4.10.4.6.4[A] Lockers

If lockers are provided, they shall be installed at least 3.5 inches *(8.9 cm)* above the finished floor or on legs or a base at least 3.5 inches *(8.9 cm)* high and far enough apart to allow for cleaning and drying underneath the locker.

4.10.4.6.5 Soap Dispensers

Soap dispensers shall be securely attached adjacent to hand washing sinks and at each CLEANSING SHOWER.

4.10.4.6.5.1 Dispenser Materials

The dispensers shall be of all metal, plastic, or other shatterproof materials that can be readily and frequently cleaned.

4.10.4.6.6[A] Dryers / Paper Towels

Hand dryers or paper towel dispensers shall be provided and securely attached adjacent to hand washing sinks.

4.10.4.6.6.1 Materials

Hand dryers and paper towel dispensers shall be of all metal, plastic or other shatterproof materials that can be readily and frequently cleaned.

4.10.4.6.7 Toilet Paper Dispensers

Toilet paper dispensers shall be securely attached to wall or partition adjacent to each toilet.

4.10.4.6.8 Female Facilities

In female HYGIENE FACILITIES, covered receptacles adjacent to each toilet shall be provided for disposal of used feminine hygiene products.

4.10.4.6.9 Trash Can

A minimum of one hands-free trash receptacle shall be provided in areas adjacent to hand washing sinks.

4.10.5[A] Provision of Suits, Towels, and Shared Equipment

4.10.5.1 Adequate Space

AQUATIC FACILITIES supplying reusable suits, towels, and/or shared equipment shall provide adequate equipment and space for cleaning, sanitizing, drying, and storing of these materials.

4.10.6[A] Foot Baths

4.10.6.1 Prohibited

FOOT BATHS shall be prohibited.

4.10.7[A] Sharps

4.10.7.1 Container

If razors or other sharps are supplied by the AQUATIC FACILITY, a sharps container approved by local, state or federal regulations shall be provided within the HYGIENE FACILITY.

4.11 Water Supply/ Wastewater Disposal

4.11.1 Water Supply

4.11.1.1 Public Water System

Water serving an AQUATIC FACILITY shall be supplied from a potable water source.

4.11.1.1.1[A] Other Sources

Other water sources such as lakes or springs may be approved to serve an AQUATIC FACILITY by the AHJ.

4.11.1.1.2[A] Condensate / Reclaimed Water

Use of condensate water, collected rain water, or other reclaimed water for water serving an AQUATIC VENUE is prohibited.

4.11.1.1.2.1 Condensate Use

Condensate water may be used for irrigation or other non-potable uses.

4.11.1.1.2.2 Exceptions

Exceptions to MAHC 4.11.1.1.2 may be made by the AHJ with evidence that such water has met all EPA potable water quality STANDARDS.

4.11.1.2[A] Sufficient Capacity

The water supply shall have sufficient capacity to simultaneously serve all PLUMBING FIXTURES.

4.11.1.2.1 Refill Pool

The water supply shall have sufficient capacity and pressure to refill the AQUATIC VENUE to the operating water level after backwashing filters and after any splashing or evaporative losses within one hour if the AQUATIC VENUE is operational at the time of the backwash.

4.11.2[A] Fill Spout

4.11.2.1 Hazard

If a fill spout is used at an AQUATIC VENUE, the fill spout shall be located so that it is not a SAFETY hazard to BATHERS.

4.11.2.2 Shielded

A fill spout should be located so the possibility of it becoming a trip hazard is minimized.

4.11.2.3 Open End

The open end of fill spouts shall not have sharp edges or protrude more than two inches *(50.8 mm)* beyond the edge of the POOL.

4.11.2.4 Air Gap

The open end shall be separated from the water by an air gap of at least 1.5 pipe diameters measured from the pipe outlet to the POOL.

4.11.3[A] Cross-Connection Control

4.11.3.1 Protected

The potable water supply serving an AQUATIC VENUE shall be protected against BACKFLOW consisting of either of the following:

1) An acceptable air gap consisting of a vertical distance of not less than two pipe diameters of the water supply pipe or six inches *(15.2 cm)*, whichever is greater, over the lowest free-flowing discharge point of the receiving pipe, tank, or vessel. Splash guards that are open to the atmosphere may be used around the air gap, or
2) Where permitted, an approved RPZ BACKFLOW preventer installed according to the plumbing CODE and the AHJ.

4.11.4 Deck Drains and Rinse Showers

4.11.4.1 Sloped Walkway

The walkway or DECK around an AQUATIC VENUE shall be properly sloped to DECK drains or to the edge of the DECK to prevent the accumulation of standing water.

4.11.4.2 Discharge

If DECK drains are provided, the drains shall discharge to the sanitary or storm sewer or as otherwise allowed by the AHJ and according to applicable plumbing CODES.

4.11.4.3 Area or Linear

DECK drains may be either area drains or linear drains. Refer to MAHC 4.8.1.3 for DECK drain area and other requirements.

4.11.4.4 Rinse Showers

RINSE SHOWER drains shall discharge to the sanitary or storm sewer as allowed by the AHJ and according to applicable plumbing CODES.

4.11.5 Sanitary Wastes

4.11.5.1 Discharged

Wastewater from all PLUMBING FIXTURES in the entire AQUATIC FACILITY shall be discharged to a municipal sanitary sewer system, if available.

4.11.5.2 On-Site Sewer System

If a municipal sanitary sewer system is not available, all wastewater shall be disposed to an on-site sewer system that is properly designed to receive the entire wastewater capacity.

4.11.6[A] Pool Wastewater

4.11.6.1 Discharged

Wastewater from an AQUATIC VENUE, including filter backwash water, shall be discharged to a sanitary sewer system having sufficient capacity to collect and treat wastewater or to an on-site sewage disposal system designed for this purpose.

4.11.6.1.1 Storm Water Systems and Surface Waters

Wastewater shall not be directed to storm water systems or surface waters without appropriate permits from the AHJ or the U.S. EPA.

4.11.6.1.2 Recovery and Reuse

A water recovery and reuse system may be submitted to the AHJ for review and approval.

4.11.6.2[A] Ground Surface

If a municipal sanitary sewer system is not available, wastewater from an AQUATIC VENUE may be discharged to the ground surface at a suitable location as approved by the AHJ.

4.11.6.2.1 Discharged

Wastewater discharged in this manner shall not cause erosion or create a threat to public health or SAFETY, a nuisance, or unlawful pollution of public waters.

4.11.6.3 Capacity

The wastewater disposal system shall have sufficient capacity to receive wastewater without flooding when filters are cleaned or when the AQUATIC VENUE is drained.

4.11.6.4[A] Separation Tank for Precoat Media Filters

A separation tank shall be provided prior to discharge for backwash water from precoat filters using diatomaceous earth *(DE)* as a filter medium.

4.11.6.4.1 Discharged

For precoat filters using perlite or cellulose as a filter medium, the backwash may be discharged to the sanitary sewer, unless directed otherwise by the local AHJ.

4.12 Specific Aquatic Venues

4.12.1 Spas

4.12.1.1 Additional Provisions

In addition to the general AQUATIC VENUE requirements stated in this CODE, SPAS shall comply with the additional provisions or reliefs of this section.

4.12.1.2[A] Maximum Water Depth

The maximum water depth in SPAS shall be four feet *(1.2 m)* measured from the designed static water line except for SPAS that are designed for SPECIAL USE and purposes and approved by the AHJ.

4.12.1.2.1 Exercise Spas

The water depth for exercise SPAS shall not exceed six feet six inches *(2.0 m)* measured from the designed static water line.

4.12.1.2.2 Seating

The maximum submerged depth of any seat or sitting bench shall be 28 inches *(71.1 cm)* measured from the water line.

4.12.1.3[A] Handholds

A SPA shall have one or more suitable, slip-resistant handhold*(s)* around the perimeter and not over 12 inches *(30.5 cm)* above the water line.

4.12.1.3.1 Options

The handhold*(s)* may consist of bull-nosed coping, ledges or DECKS along the immediate top edge of the SPA; ladders, steps, or seat ledges; or railings.

4.12.1.4 Stairs

Interior steps or stairs shall be provided where SPA depths are greater than 24 inches *(61.0 cm)*.

4.12.1.4.1 Handrail

Each set of steps shall be provided with at least one handrail to serve all treads and risers.

4.12.1.4.2 Seating

Seats or benches may be provided as part of these steps.

4.12.1.4.3 Approach Steps

Approach steps on the exterior of a SPA wall extending above the DECK shall also be required unless the raised SPA wall is 19 inches *(48.3 cm)* or less in height above the DECK and it is used as a transfer tier or pivot-seated entry.

4.12.1.5[A] Perimeter Deck

A four foot *(1.2 m)* wide, continuous, unobstructed PERIMETER DECK shall be provided on two consecutive or adjacent sides or fifty percent or more of the SPA perimeter.

4.12.1.5.1 Lower Ratio

The AHJ could consider a lower ratio upon review of an appropriate SAFETY PLAN that addresses adequate access.

4.12.1.5.2 Coping

The PERIMETER DECK may include the coping.

4.12.1.5.3 Recessed

SPAS may be located adjacent to other AQUATIC VENUES as long as they are recessed in the DECK.

4.12.1.5.4[A] Elevated Spas

Elevated SPAS may be located adjacent to another AQUATIC VENUE as long as there is an effective BARRIER between the SPA and the adjacent AQUATIC VENUE.

4.12.1.5.5 Minimum Distance

If an effective BARRIER is not provided, a minimum distance of four feet *(1.2 m)* between the AQUATIC VENUE and SPA is required.

4.12.1.6 Depth Markers

A minimum of two depth markers shall be provided regardless of the shape or size of the SPA.

4.12.1.7[A] Temperature

Water temperatures shall not exceed 104°F *(40°C)*.

4.12.1.8 Drain

A means to drain the SPA shall be provided to allow frequent draining and cleaning.

4.12.1.9 Air Induction System

An air induction system, when provided, shall prevent water back up that could cause electrical shock hazards.

4.12.1.9.1 Intake

Air intake sources shall not permit the introduction of toxic fumes or other CONTAMINANTS.

4.12.1.10[A] Timers

The agitation system shall be connected to a minute timer that does not exceed 15 minutes.

4.12.1.10.1 Out of Bather Reach

The agitation system shall be connected to a minute timer located out of reach of a BATHER in the SPA.

4.12.1.11[A] Emergency Shutoff

All SPAS shall have a clearly labeled emergency shutoff or control switch for the purpose of stopping the motor*(s)* that provide power to the RECIRCULATION SYSTEM and hydrotherapy or agitation system.

4.12.1.11.1 Readily Accessible

All SPAS shall have a clearly labeled emergency shutoff or control switch that shall be installed and be readily accessible to the BATHERS, in accordance with the NEC.

4.12.2 Waterslides and Landing Pools

4.12.2.1[A] Design and Construction

4.12.2.1.1 Additional Provisions

In addition to the general AQUATIC FACILITY requirements stated in this CODE, WATERSLIDES and LANDING POOLS shall comply with the additional provisions or reliefs of this section.

4.12.2.1.2 Recognized Standards

The following recognized design and construction STANDARDS for WATERSLIDES shall be adhered to.

4.12.2.1.2.1 Engineer Compliance

The design engineer shall address compliance with these STANDARDS and must provide documentation and/or certification that the WATERSLIDE design is in conformance with these STANDARDS:

1) ASTM F2376-13 *Standard Practice for Classification, Design, Manufacture, Construction, and Operation of Water Slide Systems; and*
2) ASTM F2469-09 *Standard Practice for Manufacturer, Construction, Operation, and Maintenance of Aquatic Play Equipment*.

4.12.2.1.2.2 Required Signage

Signs indicating riding instructions, warnings, and requirements in accordance with the manufacturer recommendations shall be posted at the WATERSLIDE entry.

4.12.2.2 Flumes

4.12.2.2.1 Surfaces

FLUME surfaces shall be inert, nontoxic, smooth, and easily cleaned.

4.12.2.2.2 Dips

All FLUME VALLEYS and DIPS shall have proper drainage, SAFETY measures that insure a rider cannot fall from the FLUME, and a means of egress in the event the ride malfunctions or a rider stops on the ride.

4.12.2.3 Flume Exits

4.12.2.3.1 Landing Pool

The exit of any FLUME must be designed to ensure that BATHERS enter the LANDING POOL or SLIDE RUNOUT at a safe speed and angle of entry.

4.12.2.3.2 Intersection

If a WATERSLIDE has two or more FLUMES and there is a point of intersection between the centerlines of any two FLUMES, the distance between that point and the point of exit for each intersecting FLUME must not be less than the SLIDE manufacturer's recommendations and ASTM F2376.

4.12.2.4[A] Exit into Landing Pools

4.12.2.4.1 Water Level

WATERSLIDES shall be designed to terminate at or below water level, except for DROP SLIDES or unless otherwise permitted by the WATERSLIDE manufacturer and ASTM F2376.

4.12.2.4.2 Perpendicular

WATERSLIDES shall be perpendicular to the wall of the AQUATIC VENUE at the point of exit unless otherwise permitted by the WATERSLIDE manufacturer.

4.12.2.4.3 Exit System

WATERSLIDES shall be designed with an exit system which shall be in accordance with the WATERSLIDE manufacturer's recommendations and ASTM F2376 and

4.12.2.4.3.1 Safe Entry

WATERSLIDES shall be designed with an exit system which shall provide safe entry into the LANDING POOL or WATERSLIDE RUNOUT.

4.12.2.4.4 Flume Exits

The FLUME exits shall be in accordance with the WATERSLIDE manufacturer's recommendations and ASTM F2376.

4.12.2.4.5 Point of Exit

The distance between the point of exit and the side of the AQUATIC VENUE opposite the BATHERS as they exit, excluding any steps, shall not be less than the WATERSLIDE manufacturer's recommendations and in accordance with ASTM F2376.

4.12.2.5 Landing Pools

4.12.2.5.1 Steps

If steps are provided instead of exit ladders or RECESSED STEPS with grab rails, they shall be installed at the opposite end of the LANDING POOL from the FLUME exit with a handrail.

4.12.2.5.2 Landing Area

If the WATERSLIDE FLUME ends in a swimming POOL, the landing area shall be divided from the rest of the AQUATIC VENUE by a float line, WING WALL, PENINSULA or other similar feature to prevent collisions with other BATHERS.

4.12.2.6 Decks

A PERIMETER DECK shall be provided along the exit side of the LANDING POOL.

4.12.2.7 Means of Access

A walkway, steps, stairway or ramp shall be provided between the LANDING POOL and the top of the FLUME. Refer to MAHC 4.8.1 for more guidance on deck spaces.

4.12.2.8 Slide Runouts

4.12.2.8.1 Egress

WATERSLIDE RUNOUTS, if used, shall have a planned means of egress, unless one of the walls of the RUNOUT is not more than 19 inches *(48.3 cm)* in height.

4.12.2.8.2 Designed

WATERSLIDE RUNOUTS shall be designed in accordance with the SLIDE manufacturer's recommendations and ASTM F2376.

4.12.2.9[A] Drop Slides

4.12.2.9.1 Landing Area

There shall be a SLIDE landing area in accordance with the SLIDE manufacturer's recommendations and ASTM F2376.

4.12.2.9.2 Area Clearance

This area shall not infringe on the landing area for any other SLIDES, diving equipment, or any other minimum AQUATIC VENUE clearance requirements.

4.12.2.9.3 Steps

Steps shall not infringe on this area.

4.12.2.9.4 Water Depth

The minimum required water depth shall be a function of the vertical distance between the terminus of the SLIDE surface and the water surface of the LANDING POOL.

4.12.2.9.5 Manufacturer's Recommendation

The minimum required water depth shall be in accordance with the SLIDE manufacturer's recommendations and ASTM F2376.

4.12.2.10 Pool Slides

4.12.2.10.1 Designed for Safety

All SLIDES installed as an appurtenance to an AQUATIC VENUE shall be designed, constructed, and installed to provide a safe environment for all BATHERS utilizing the AQUATIC VENUE in accordance with applicable ASTM and CPSC STANDARDS.

4.12.2.10.2 Non-Toxic

Components used to construct a POOL SLIDE shall be non-toxic and compatible with the environment contacted under normal use.

4.12.2.10.3 Water Depth

Water depth at the SLIDE terminus shall be determined by the SLIDE manufacturer.

4.12.2.10.4 Pool Edge

Clear space shall be maintained to the POOL edge and other features per manufacturer requirements.

4.12.2.10.4.1 Landing Area

The landing area of the SLIDE shall be protected through the use of a float line, WING WALL, PENINSULA or other similar impediment to prevent collisions with other BATHERS.

4.12.2.10.4.2 Prevent Bather Access

Netting or other BARRIERS shall be provided to prevent BATHER access underneath POOL SLIDES where sufficient clearance is not provided.

4.12.2.10.4.3 Netting or Barrier

Such netting or other BARRIER shall be designed such that any underwater opening does not allow for the passage of a four inch *(10.2 cm)* ball and no opening can create a finger entrapment.

4.12.2.11 Signage

Warning signs in accordance with manufacturer's recommendations shall be provided.

4.12.3[A] Wave Pools

4.12.3.1 General

4.12.3.1.1 Additional Provisions

In addition to the general swimming POOL requirements stated in this CODE, WAVE POOLS shall comply with the additional provisions or reliefs of this section.

4.12.3.2 Access

4.12.3.2.1 Access Point

BATHERS must gain access to the WAVE POOL at the shallow or beach end with the exception of an allowable ADA designated entry point.

4.12.3.2.1.1 Sides

The sides of the WAVE POOL shall be protected from unauthorized entry into the WAVE POOL by the use of a fence or other comparable BARRIER.

4.12.3.2.1.2 Handrails

Handrails as required by ADA for accessible entries shall be designed in such a way that they do not present a potential for injury or entrapment with WAVE POOL BATHERS.

4.12.3.2.2 Perimeter Decks

A PERIMETER DECK shall not be required around 100% of the WAVE POOL perimeter.

4.12.3.2.2.1 Wave Pool Access

A PERIMETER DECK shall be provided where BATHERS gain access to the WAVE POOL at the shallow or beach end and in locations where access is required for lifeguards.

4.12.3.2.3 Handholds

WAVE POOLS shall be provided with handholds at the static water level or not more than six inches *(15.2 cm)* above the static water level.

4.12.3.2.3.1 Continuous

These handholds shall be continuous around the WAVE POOL'S perimeter with the exception of at the ZERO DEPTH BEACH ENTRY, water depths less than 24 inches *(61.0 cm),* if this area is roped off not allowed for BATHER access.

4.12.3.2.3.2 Self Draining

These handholds shall be self-draining.

4.12.3.2.3.3 Flush

Handholds shall be installed so that their outer edge is flush with the WAVE POOL wall.

4.12.3.2.3.4 Entangled

The design of the handholds shall ensure that body extremities will not become entangled during wave action.

4.12.3.2.4 Steps and Handrails

RECESSED STEPS shall not be allowed along the walls of the WAVE POOL due to the entrapment potential.

4.12.3.2.5 Ladders

Side wall ladders shall be utilized for egress only.

4.12.3.2.5.1 Placement

Side wall ladders shall be placed so they do not project beyond the plane of the wall surface.

4.12.3.2.6 Float Line

WAVE POOLS shall be fitted with a float line located to restrict access to the caisson wall if required by the WAVE POOL equipment manufacturer.

4.12.3.2.6.1 Exceptions

SAFETY rope and float lines typically required at shallow to deep water transitions shall not apply to WAVE POOLS.

4.12.3.3 Safety

4.12.3.3.1 Life Jackets

Proper STORAGE shall be provided for life jackets and all other equipment used in the WAVE POOL that will allow for thorough drying to prevent mold and other biological growth.

4.12.3.3.2 Shut-Off Switch

A minimum of two emergency shut-off switches to disable the wave action shall be provided, one on each side of the WAVE POOL.

4.12.3.3.2.1 Labeled and Accessible

These switches shall be clearly labeled and readily accessible to QUALIFIED LIFEGUARDS.

4.12.3.3.3 No Diving Sign

SAFETY rope and float lines typically required at shallow to deep water transitions shall not apply to WAVE POOLS.

4.12.3.3.4 Caution Signs

Caisson BARRIERS shall be provided for all WAVE POOLS that prevent the passage of a four-inch *(10.2 cm)* ball.

4.12.4 Therapy Pools

4.12.4.1 Additional Provisions

In addition to the general AQUATIC VENUE requirements stated in this CODE, THERAPY POOLS shall comply with the additional provisions or reliefs of this section and MAHC 4.7.3.3 on SECONDARY DISINFECTION.

4.12.4.2 Slope

Floor slope may exceed one foot *(30.5 cm)* in 12 feet *(3.7 m)* for water shallower than five feet *(1.5 m)*.

4.12.4.2.1 Break Points

Break points in floor slope shall be identified with a contrasting band consistent with MAHC 4.5.4.2.

4.12.4.3 Hydrotherapy

Hydrotherapy or jet systems shall be independent of the recirculation, filtration, and heating systems.

4.12.4.4 Special Equipment

Special equipment may be allowed by the AHJ with proper justification.

4.12.5 Lazy Rivers

4.12.5.1 General

4.12.5.1.1 Additional Provisions

In addition to the general swimming AQUATIC VENUE requirements stated in this CODE, LAZY RIVERS shall comply with the additional provisions or reliefs of this section.

4.12.5.1.2 Protrusions

Handrails, steps, stairs and propulsion jets for LAZY RIVERS shall not protrude into the river.

4.12.5.2 Access and Egress

4.12.5.2.1[A] Means

Means of access/egress shall be provided at 150 foot *(45.7 m)* intervals around the LAZY RIVER.

4.12.5.2.2 Handhold

A handhold in compliance with MAHC 4.5.5 shall be required on at least one side of the LAZY RIVER.

4.12.5.2.3[A] Deck

A DECK shall be provided along the entire length of the LAZY RIVER.

4.12.5.2.3.1 Alternate Sides

The DECK shall be allowed to alternate sides of the LAZY RIVER.

4.12.5.2.3.2 Obstructions

Obstructions around the perimeter of the LAZY RIVER, such as bridges or landscaping, shall be allowed provided they do not impact lifeguarding, sight lines, or rescue operations.

4.12.5.2.4[A] Bridges

All bridges spanning a LAZY RIVER shall have a minimum clearance of both seven feet *(2.1 m)* from the bottom of the LAZY RIVER and four feet *(1.2 m)* above the water surface to any structure overhead.

4.12.6 Moveable Floors

4.12.6.1 General

4.12.6.1.1 Additional Provisions

In addition to the general swimming AQUATIC VENUE requirements stated in this CODE, MOVEABLE FLOORS shall comply with the additional provisions or reliefs of this section.

4.12.6.1.2 Water Treatment

The MOVEABLE FLOOR design shall not impede the effectiveness of the water treatment system.

4.12.6.1.3 Underneath

MOVEABLE FLOORS shall allow inspection, cleaning and maintenance of the area underneath.

4.12.6.2 Slip Resistance

The surface of the MOVEABLE FLOOR shall be slip resistant if it is intended for installation in water depths less than five feet *(1.5 m)*.

4.12.6.3 Safety

4.12.6.3.1[A] Not Continuous

A strategy for preventing BATHERS from transitioning to deeper water when a MOVEABLE FLOOR is not continuous over the entire surface area of the AQUATIC VENUE shall be provided.

4.12.6.3.2[A] Underside

The underside of the MOVEABLE FLOOR shall not be accessible to BATHERS.

4.12.6.3.3 Entrapment

The design of a MOVEABLE FLOOR shall protect against BATHER entrapment between the MOVEABLE FLOOR and the POOL walls and floor.

4.12.6.3.4 Hydraulic Fluid

If the MOVEABLE FLOOR is operated using hydraulics, the hydraulic compounds shall be listed as safe for use in POOL water in case there is a hydraulic leak.

4.12.6.4[A] Movement

4.12.6.4.1 Speed

The speed of a MOVEABLE FLOOR shall be less than or equal to 1.5 feet per minute *(45.7 cm/min)*.

4.12.6.4.2 Use

Use of the MOVEABLE FLOOR portion of the POOL shall not be open to BATHERS when the floor is being raised or lowered.

4.12.6.4.2.1 Exception

Exception: The MOVEABLE FLOOR shall only be used for accessibility purposes under direct supervision.

4.12.6.5 Water Depth and Markings

4.12.6.5.1 Displayed

A floor depth indicator shall be provided that displays the current POOL water depth.

4.12.6.5.2 Warning Markings

Warning markings stating “Moveable Floor” shall be provided at 25 foot *(7.6 m)* intervals around the perimeter of the MOVEABLE FLOOR.

4.12.7 Bulkheads

4.12.7.1 Additional Provisions

In addition to the general AQUATIC VENUE requirements stated in this CODE, BULKHEADS shall comply with the additional provisions or reliefs of this section.

4.12.7.2[A] Entrapment

The bottom of the BULKHEAD shall be designed so that a BATHER cannot be entrapped underneath or inside of the BULKHEAD.

4.12.7.3 Placement

The BULKHEAD placement shall not interfere with the required water circulation in the POOL.

4.12.7.4 Fixed

BULKHEADS shall be fixed to their operational position*(s)* by a tamper-proof system.

4.12.7.5[A] Gap

The gap between the BULKHEAD and the POOL wall shall be no greater than 1.5 inches *(3.8 cm)*.

4.12.7.6[A] Handhold

The BULKHEAD shall be designed to afford an acceptable handhold as required in MAHC 4.5.14.

4.12.7.7 Entrances and Exits

The proper number of entrances/exits to the POOL as required by MAHC 4.5.3 shall be provided when the BULKHEAD is in place.

4.12.7.8 Guard Railings

Guard railings at least 34 inches *(86.4 cm)* tall shall be provided on both ends of the BULKHEAD.

4.12.7.9[A] Width

The width of the walkable area *(total BULKHEAD width)* of a BULKHEAD shall be greater than or equal to three feet and three inches *(1.0 m)*.

4.12.7.9.1[A] Starting Platforms

If starting platforms are installed, the width of the walkable area *(total BULKHEAD width)* of a BULKHEAD shall be greater than or equal to three feet and nine inches *(1.1 m)*.

4.12.7.9.1.1 Side Mount Style

Starting platforms shall be "side mount" style if BULKHEAD is less than four feet six inches *(1.4 m)* wide.

4.12.7.10 Bulkhead Travel

The travel of a BULKHEAD shall be in accordance with one of the following:

1) Limited such that it cannot encroach on any required clearances of other features, such as diving boards; or
2) Designed with modifications incorporated that prevent use of other features when the required clearances have been compromised by the position of the BULKHEAD.

4.12.8 Interactive Water Play Venues

4.12.8.1 Additional Provisions

In addition to the general AQUATIC VENUE requirements stated in this CODE, INTERACTIVE WATER PLAY VENUES shall comply with the additional provisions or reliefs of this section.

4.12.8.2 Surface

INTERACTIVE WATER PLAY VENUES shall have a slip-resistant and easily cleanable surface.

4.12.8.2.1 Manufactured Surfacing

Any manufactured surfacing shall be deemed suitable by the manufacturer for aquatic and chlorinated environments.

4.12.8.3[A] Sloped

The INTERACTIVE WATER PLAY VENUE shall be properly sloped so that only water from the AQUATIC FEATURES flows back to the INTERACTIVE WATER PLAY VENUE collection tank.

4.12.8.3.1 Adjacent Areas

Areas adjacent to the INTERACTIVE WATER PLAY VENUE shall be sloped away from the collection drains.

4.12.8.3.2 Water Collection

The slope of the INTERACTIVE WATER PLAY VENUE shall be sufficient to prevent standing water from collecting on the pad.

4.12.8.4 Drains

The size, number and locations of the INTERACTIVE WATER PLAY VENUE drains shall be determined and specified so as to assure water does not accumulate on the INTERACTIVE WATER PLAY VENUES.

4.12.8.4.1 Gravity

Flow through the drains to the INTERACTIVE WATER PLAY VENUE COLLECTION TANK shall be under gravity.

4.12.8.4.2 Direct Suction Outlets

Direct suction outlets from the INTERACTIVE WATER PLAY VENUE shall be prohibited.

4.12.8.5 Grate Openings

Openings in the grates covering the drains shall not exceed ½ inches *(12.7 mm)* wide.

4.12.8.5.1 Tools

Gratings shall not be removable without the use of tools.

4.12.8.6 Treatment Tank

The INTERACTIVE WATER PLAY VENUE COLLECTION TANK shall be designed to provide ready access for cleaning and inspections, and

4.12.8.6.1 Completely Drain

The interactive water play venue collection tank shall be capable of complete draining.

4.12.8.6.2 Access Hatch

The access hatch or lid shall be locked or require a tool to open.

4.12.8.7 Deck Area

INTERACTIVE WATER PLAY VENUES shall be kept free of landscape debris by either:

1) Eight feet *(2.4 m)* of DECK area, or
2) Raised curbs, or
3) Raised planters.

4.12.8.7.1 Deck Surface

The DECK shall be of a uniform, easily cleaned, impervious material

4.12.8.7.2 Protected From Runoff

The DECK shall be protected from surface runoff.

4.12.8.8 Barrier

A BARRIER shall be provided to separate an INTERACTIVE WATER PLAY VENUE from another BODY OF WATER within the same facility

4.12.8.8.1 Separated by Distance

Exception: The INTERACTIVE WATER PLAY VENUE is separated by a distance of at least 15 feet *(4.6 m)* from other BODIES OF WATER.

4.12.8.9 Enclosures

If a facility only consists of an INTERACTIVE WATER PLAY VENUE, then the requirements for an ENCLOSURE shall not apply.

4.12.8.10[A] Hazard

Spray features shall be designed and installed to be seen clearly, so as not to be a hazard to BATHERS due to water velocity from the spray feature discharge, or other SAFETY hazards.

4.12.8.11 Maximum Velocity

Maximum velocity at the orifice of the SPRAY FEATURE nozzle shall not exceed 20 feet *(6.1 m)* per second.

4.12.8.12[A] Signage

Depth markings and warning signs shall not be required for INTERACTIVE WATER PLAY VENUES.

4.12.8.13 NEC Requirements

NEC swimming POOL requirements shall apply to Interactive water play venues.

4.12.9 Wading Pools

4.12.9.1 Additional Provisions

In addition to the general AQUATIC VENUE requirements stated in this CODE, WADING POOLS shall comply with the additional provisions or reliefs of this section.

4.12.9.2[A] Barrier

A BARRIER shall be provided to separate a WADING POOL from other POOLS unless the WADING POOL is separated by a distance of 15 feet *(4.6 m)* from other BODIES OF WATER.

4.12.9.2.1 Complete Enclosure

The BARRIER shall not be required to completely surround the WADING POOL if the shortest distance of travel between the WADING POOL around the BARRIER to the other POOL is a minimum of 15 feet *(4.67 m)*.

4.12.9.2.2[A] Shallow Water

WADING POOLS near other WADING POOLS shall not be required to be separated by a BARRIER.

4.12.10[A] Other Aquatic Features

Other AQUATIC FEATURES not otherwise addressed in the CODE, including but not limited to climbing walls, inflatables, and play structures, shall not be installed unless designed and operated in accordance with all manufacturer's installation and operations recommendations.