

## Model Aquatic Health Code

### Draft Hygiene Facilities Module ANNEX Sections Modified after the First 60-day Review that Closed for Public Comment on 12/29/2011

#### Informational Copy: NOT Currently Open for Public Comment

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***This version of the MAHC Hygiene Facilities Module has been modified based on the first round of public comments received. It is being re-posted so users can view how it was modified but is not currently open to public comment. The complete draft MAHC, with all of the individual module review comments addressed will be posted again for a final review and comment before MAHC publication. This will enable reviewers to review modules in the context of other modules and sections that may not have been possible during the initial individual module review. The public comments and MAHC responses can be viewed on the web at <http://www.cdc.gov/healthywater/swimming/pools/mahc/structure-content/index.html>***

***The MAHC committees appreciate your patience with the review process and commitment to this endeavor as we all seek to produce the best aquatic health code possible.***

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## MAHC Hygiene Facilities Module Abstract

Swimmer hygiene is a critical component that plays a role in documented waterborne disease outbreaks and poor water quality. The Hygiene Facilities Module is a first step towards improving swimmer hygiene and facility water quality to reduce the associated health effects. The Hygiene Facilities Module contains requirements primarily for new or modified construction that include:

- 1) Minimum distances for hygiene facilities from aquatic venues.
- 2) Diaper changing stations.
- 3) Implementation of rinse vs. cleansing showers.

## Table of Contents

The Hygiene Facilities CODE Module shows a Table of Contents giving the context of the Hygiene Facilities Design, Construction, Operation and Maintenance in the overall Model Aquatic Health Code's Strawman Outline

(<http://www.cdc.gov/healthywater/pdf/swimming/pools/mahc/structure-content/mahc-strawman.pdf>).

### *Note on the MAHC Annex*

## Rationale

The annex is provided to:

- (a) Give explanations, data, and references to support why specific recommendations are made;
- (b) Discuss the rationale for making the code content decisions;
- (c) Provide a discussion of the scientific basis for selecting certain criteria, as well as discuss why other scientific data may not have been selected, e.g. due to data inconsistencies;
- (d) State areas where additional research may be needed;
- (e) Discuss and explain terminology used; and
- (f) Provide additional material that may not have been appropriately placed in the main body of the model code language. This could include summaries of scientific studies, charts, graphs, or other illustrative materials.

## Content

The annexes accompanying the code sections are intended to provide support and assistance to those charged with applying and using Model Aquatic Health Code provisions. No reference is made in the text of a code provision to the annexes which

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support its requirements. This is necessary in order to keep future laws or other requirements based on the Model Aquatic Health Code straightforward. However, the annexes are provided specifically to assist users in understanding and applying the provisions uniformly and effectively. They are not intended to be exhaustive reviews of the scientific or other literature but should contain enough information and references to guide the reader to more extensive information and review.

It is, therefore, important for reviewers and users to preview the subject and essence of each of the annexes before using the document. Some of the annexes (e.g., References, Public Health Rationale) are structured to present the information in a column format similar to the code section to which they apply. Other annexes or appendices provide information and materials intended to be helpful to the user such as model forms that can be used, recreational water illness outbreak response guidelines, and guidelines for facility inspection.

## Appendices

Additional information that falls outside the flow of the annex may be included in the Model Aquatic Health Code Annex

**Acronyms in this Module:** See the Hygiene Facilities Module, Code Section

**Glossary Terms in this Module:** See the Hygiene Facilities Module, Code Section

**Preface:** *This document does not address all health and safety concerns, if any, associated with its use. It is the responsibility of the user of this document to establish appropriate health and safety practices and determine the applicability of regulatory limitations prior to each use.*

## Model Aquatic Health Code

### Hygiene Facilities ANNEX

#### 4.0 Design Standards and Construction

Keyword	Section	Annex
	<b>4.0</b>	<b>Design Standards and Construction</b>
	<b>4.1</b>	<b>Plan Submittal</b>
	<b>4.2</b>	<b>Materials</b>
	<b>4.3</b>	<b>Equipment Standards</b>
	<b>4.4</b>	<b>Pool Operation and Facility Maintenance</b>
	<b>4.5</b>	<b>Pool Structure</b>
	<b>4.6</b>	<b>Indoor/Outdoor Environment</b>
	<b>4.7</b>	<b>Recirculation and Water Treatment</b>
	<b>4.8</b>	<b>Decks and Equipment</b>
	<b>4.9</b>	<b>Filter/Equipment Room</b>
	<b>4.10</b>	<b>Hygiene Facilities</b>
	<b>4.10.1</b>	<b>General</b>
General	4.10.1	Language similar to this section is found in most state CODES.
Hygiene Facilities	4.10.1.2	During 2007–2008, 58 (82.9%) of 70 treated recreational water–associated outbreaks of diarrheal illness were caused by <i>Cryptosporidium</i> . <sup>1</sup> These cryptosporidiosis outbreaks tend to disproportionately affect children <5 years of age and can cause community-wide outbreaks. <sup>2</sup> Infectious <i>Cryptosporidium</i> oocysts' extreme chlorine tolerance allows them to survive for 3.5–10.6 days when free chlorine levels are maintained at 1–3 mg/L. <sup>3</sup> The oocysts small size (4.5 µm x 5.5 µm) also allows them to bypass typical sand and cartridge filters. <sup>4</sup> While secondary or supplemental disinfection can inactivate the oocysts, these ultraviolet and ozone treatment systems are

<sup>1</sup> Hlavsa *et al.* Surveillance for waterborne disease outbreaks and other health events associated with recreational water use and other aquatic facility–associated health events — United States, 2007–2008. *MMWR Surv Summ.* 2011;60(SS-12):1–37.

<sup>2</sup> CDC. Communitywide cryptosporidiosis outbreak--Utah, 2007. *MMWR Morb Mortal Wkly Rep.* 2008;57(36):989-93.

<sup>3</sup> Shields *et al.* Inactivation of *Cryptosporidium parvum* under chlorinated recreational water conditions. *J Water Health* 2008;6(4):513–20.

<sup>4</sup> Smith H. Diagnostics. In: Fayer R, Xiao L, eds. *Cryptosporidium* and cryptosporidiosis. 2nd ed. Boca Raton, Florida: CRC Press, 2008:173–207.

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circulation dependent.<sup>5,6,7,8,9</sup>

Thus, changing BATHER behavior in the following ways are needed to help prevent cryptosporidiosis outbreaks:

- Enforcement of policies that exclude swimmers with diarrhea,
- Swimmer education about hygienic swimming behaviors (e.g., taking a CLEANSING SHOWER before entering the water, not swallowing the water), and
- Using secondary or supplemental disinfection.

*Chloramines*

During January–March 2007, >660 BATHERS and aquatic staff at a waterpark experienced respiratory symptoms and eye irritation caused by chloramines.<sup>10</sup> Chloramines form when free chlorine oxidizes nitrogenous compounds (e.g., sweat, urine, and personal care products) that wash off BATHERS' bodies. Chloramines can volatilize into the air where it can accumulate in air of indoor AQUATIC VENUES. One (17%) in five American adults reports having ever urinated in a pool<sup>11</sup>, and elite athletes can sweat >700 ml/h.<sup>12</sup> Rinsing off in the shower for 60 seconds and wearing bathing caps significantly decreases the amount of total organic carbon and total nitrogen.<sup>13</sup> Studies also suggest that ultraviolet treatment can reduce chloramine levels in the water.<sup>14,15</sup>

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<sup>5</sup> Betancourt WQ, Rose JB. Drinking water treatment processes for removal of *Cryptosporidium* and *Giardia*. *Vet Parasitol.* 2004;126(1-2):219-34.

<sup>6</sup> Craik SA *et al.* Inactivation of *Cryptosporidium parvum* oocysts using medium- and low-pressure ultraviolet radiation. *Water Res.* 2001;35(6):1387-98.

<sup>7</sup> Rochelle PA *et al.* The response of *Cryptosporidium parvum* to UV light. *Trends Parasitol.* 2005;21(2):81-7.

<sup>8</sup> Corona-Vasquez B *et al.* Inactivation of *Cryptosporidium parvum* oocysts with ozone and free chlorine. *Water Res.* 2002;36(16):4053-63.

<sup>9</sup> Korich DG *et al.* Effects of ozone, chlorine dioxide, chlorine, and monochloramine on *Cryptosporidium parvum* oocyst viability. *Appl Environ Microbiol.* 1990;56(5):1423-8.

<sup>10</sup> CDC. Respiratory and ocular symptoms among employees of a hotel indoor waterpark resort — Ohio, 2007. *MMWR* 2009; 58(4):81-85.

<sup>11</sup> Wiant C. A snapshot of swimmer hygiene behavior. *Int J Aquat Res Ed.* 2011;5(3):244-245.

<sup>12</sup> Cox *et al.* Body Mass Changes and Voluntary Fluid Intakes of Elite Level Water Polo Players and Swimmers. *J Sci Med Sport.* 5,3 (2002): 183-193.

<sup>13</sup> Keuten MGA *et al.* Definition and quantification of initial anthropogenic pollutant release in swimming pools. *Water Res.* 2012;46:3682-3692.

<sup>14</sup> Cassan D *et al.* Effects of medium-pressure UV lamps radiation on water quality in a chlorinated indoor swimming pool. *Chemosphere* 2006;62(9):1507-13.

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		<p>Accumulation of chloramines in the air at indoor treated recreational water venues can be reduced with the following practices:</p> <ul style="list-style-type: none"> <li>• Policies that require showering before entering the water,</li> <li>• Swimmer education about hygienic swimming behaviors (e.g., taking a RINSE SHOWER and using the toilet before entering the water, not urinating in the pool, and wearing bathing caps), and</li> </ul> <p>Using ultraviolet water treatment and improving ventilation.</p>
<i>Bather Load</i>	4.10.1.5	The minimum number of RINSE and CLEANSING SHOWERS should have fixture counts correlated directly to the BATHER LOAD. Any fixture counts above this should be accordance with the AHJ's requirements.
<i>Location</i>	<b>4.10.2</b>	<b>Location</b>
<i>300 Feet</i>	4.10.2.1	<p>The intent of this CODE item is to discourage patrons from drinking pool water and encourage them to keep themselves hydrated. The intent is also to encourage patrons to use the HYGIENE FACILITIES rather than urinating in the pool or changing diapers at the side of the AQUATIC VENUE or on AQUATIC VENUE furniture. Restrooms need to be easily accessible &amp; available to patrons of AQUATIC VENUES so that they will use restrooms rather than urinating or defecating in the venue water. Unlike other recreational facilities, people feel that it is more acceptable to "pee in the pool" than to not use sanitary facilities for these bodily functions and other locations. This may not be possible in large waterparks, however, they can possibly be located within 300 feet (61m) from the AQUATIC VENUE. The distance needed to walk or carry DIAPER-AGED CHILDREN should be shorter to ensure use. When possible, it is preferable to have a bathroom on the same floor as the pool; however, it is not required at this time in the MAHC.</p> <p>Drinking water should be available so that patrons, especially young children, are less likely to drink pool water and to ensure that patrons are kept well-hydrated.</p>

<sup>15</sup> Li J, Blatchley ER, 3rd. UV photodegradation of inorganic chloramines. Environ Sci Technol 2009;43(1):60-5.

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		These distances are found in multiple state or local CODES including Wisconsin, Oregon, Florida, and New York.
<i>Diaper-Aged Children</i>	4.10.2.2.	There are specific types of facilities that pose an increased risk of fecal contamination of the water and transmission to BATHERS such as wading pools, water activity pools, interactive water features, spray pads, or other AQUATIC VENUES designed primarily for DIAPER-AGED CHILDREN under five years of age. For these venues, diaper changing areas should be located directly adjacent to the kiddie areas.
		It is especially important that sanitary facilities be available to these high risk groups. Children less than five years of age have the highest incidence of diarrheal illness and are more likely to be a source of recreational water illnesses.
<i>Design and Construction</i>	<b>4.10.3</b>	<b>Design and Construction</b>
		Language similar to this section is found in most state CODES.
<i>Floors</i>	4.10.3.1	“Slip resistant” is usually considered to mean having a static coefficient of friction of 0.6 or better for both wet and dry conditions. Currently, this ASTM standard C1028 is under revision.
<i>Floor Base</i>	4.10.3.2	The purpose of coving is to prevent water splashing on the wall when mopping. Six inches, a common height, was taken from 2000 International Building Code Section 1209.1.
		For further information, also see the FDA Model Food Code for Kitchens.
<i>Opening Grill Covers</i>	4.10.3.3.1	Holes in floor drain cover openings need to be sized to prevent small children’s toes from becoming entrapped when walking over them.
<i>Sloped to Drain</i>	4.10.3.3.2	Floors not sloped to drain have been shown to allow bacterial growth on indoor and outdoor POOL DECKS <sup>22</sup> .
<i>Hose Bibb</i>	4.10.3.5	The purpose of these hose bibs is to permit adequate cleaning of shower and toilet facilities and to permit cleaning of any spills occurring in the HYGIENE FACILITY. See also MAHC Module Fecal, Blood, and Vomit Response (MAHC

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		6.5) for further rationale.
Fixture Requirements	<b>4.10.4</b>	<b>Plumbing Fixture Requirements</b>
		Language similar to this section is found in most state CODES.
Protected	4.10.4.1.1	It is fundamental that there be no cross connection between safe (potable) and unsafe (non-potable) water supplies. All hose bibbs should be equipped with a vacuum breaker to prevent back siphonage. This cross-connection protection can also be achieved at lavatories and laundry tub washing facilities through an air gap. As a general rule, the inlet pipe is terminated at a distance about four times the diameter of the pipe and not less than 4 inches above the maximum overflow level of the fixture rim.
Toilet Counts	4.10.4.1.3	Facilities in jurisdictions with requirements governing the number of sanitary facilities shall follow those requirements. Facilities with an average patron load of over 100 persons should follow the International Plumbing Code (IPC). Facilities with average patron loads of less than 100 persons should follow either the IPC or Uniform Plumbing Code (UPC). The IPC may require significantly more toilet facilities for women than for men.
		<u><b>Gender Potty Parity</b></u>
		Previous issues of the nation's model consensus CODE mandated an equal amount of toilet FIXTURES for both men and women. Newer versions of the CODE will likely provide recommendations that increase the minimum required facilities for women.
		Potty Parity discussion from Reasons to Adopt the 2000 IPC, developed by the International Conference of Building Officials (ICBO) as an informational aid to CODE officials and the public.
		The IPC requires far less HYGIENE FIXTURES for various types of occupancies than the UPC. This is contrary to the "potty parity" movement which demands more FIXTURES for women's toilet rooms to avoid the long waiting lines. The UPC also provides more water closets and urinals in most men's toilet rooms than the IPC and assures adequate water closets by limiting the number that can be deleted by

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installing additional urinals.

The authors of the ICBO have suggested that the provisions of the UPC reflect what the "potty parity movement" called for. The IPC is based upon research. The provisions of the IPC do address the issue of "potty parity" and reflect studies by Dr. Sandra Rawls at the University of Virginia, the Stevens Institute of Technology, the National Restaurant Association and the ASPE Research Foundation. The issue of "potty parity" is mostly an issue in assembly buildings with large OCCUPANT LOADS, especially where there is a period of high demand such as at intermission at a theater or at halftime at a football stadium. The "potty parity" is not an issue for occupancies where there is no instantaneous demand on the fixture usage. IPC Table 403.1 reflects requirements for twice as many FIXTURES in the ladies' room compared to the men's room, when the type of occupancy demands such a count. In occupancies where the factors do not demand such an increase, the CODE does not require it. It should also be pointed out that part of this issue arises because of some CODES requiring both water closets and urinals within the men's restroom. Therefore, the numbers for men were somewhat higher. The IPC does not have a mandatory requirement for urinals. It will generally require the same number of FIXTURES in the men's and women's restrooms. However, when two or more water closets are required, the IPC will permit up to 67 percent of the FIXTURES to be replaced by urinals. For additional supporting information, see the booklet *IPC: A Guide for Use and Adoption*:

<http://www.codereviewinc.com/download/plumbing%20code%20use%20ICC.pdf>

Some differences between the IPC and UPC CODES on this issue are as follows:

### *IPC*

- Utilizes a fixed fixture to OCCUPANT LOAD ratio.
- Does not mandate urinals for men.
- Allows Up to 67% of the requirement for water closets to be substituted for urinals.
- Establishes a separate fixture calculation factor for men and women. In some cases twice as many FIXTURES are required for women compared to men.

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- No arbitrary parity requirement.

### UPC

- Utilizes a variable fixture-to-OCCUPANT LOAD ratio.
- Requires urinals to be installed based on a fixture-to-OCCUPANT LOAD ratio. Does not allow for one to one substitutions. For each urinal added over what is required, you may have one to one substitutions up to 2/3 of what is required.
- Requires the total number of WC's for women to be equal to the total number of WC's and urinals for men.

Cleansing Showers

4.10.4.2

### Cleansing Showers

The purpose of CLEANSING SHOWERS described in this section is to remove dead skin, sweat, nitrogenous waste, and perianal fecal material before BATHERS enter the pool. This is best done through nude showering using warm water and soap.

An average of 0.14 grams of fecal material can be found on a person's peri-anal surface (the amount of feces for children ranges from 0.01-10 grams and for adults 0.0001 to 0.1 g.<sup>16</sup> Therefore, fecal contamination of the perianal area is common. This contamination may include the chlorine-tolerant parasite *Cryptosporidium* which is not inactivated by routine disinfectant levels required in AQUATIC VENUES. Since the effectiveness of most halogen-based disinfectants is reduced by the presence of organic material, the purpose of CLEANSING SHOWERS is to reduce the organic and fecal load introduced into pools.

Count

4.10.4.2.1

The ratio of 1:40 is currently required in the following states: Washington, Colorado, Oregon, Rhode Island, Wyoming, New Hampshire, Louisiana, Massachusetts, and Nevada. Based upon current state CODES and data, this requirement should not place an unnecessary burden on AQUATIC VENUES and offering more showers per BATHER will encourage

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<sup>16</sup> Gerba CP. Assessment of enteric pathogen shedding by bathers during recreational activity and its impact on water quality. Quant Micro. 2000;2:55-68.

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		BATHERS to shower prior to entering water. Further research on this topic is recommended and can be addressed in future versions of the MAHC.
<i>Location</i>	4.10.4.2.5	The placement of the showers is Intended to encourage BATHERS to see and use the showers before they enter the water.
<i>Exemption</i>	4.10.4.2.8	“Residential settings” includes condos, apartments, and homeowners associations. The intent is for BATHERS to use their rooms/homes for a CLEANSING SHOWER; however, one RINSE SHOWER on the deck is required at these facilities encouraging BATHERS to shower prior to entering water if a BATHER had not already done so.
<i>Enclosed</i>	4.10.4.2.6	Entryways to CLEANSING SHOWER compartments shall be enclosed to provide privacy. Individual shower stall curtains and doors are not required. Providing privacy for CLEANSING SHOWERS promotes BATHER cleansing prior to entering AQUATIC VENUES.
<i>Rinse Showers</i>	<b>4.10.4.3</b>	<p><b><i>Rinse Showers</i></b></p> <p>The purpose of the RINSE SHOWERS described in MAHC 4.10.4.3 is to remove inorganic material such as sand or dirt that can bind with chlorine. Rinsing with water also removes BATHER’s contaminants such as sweat, hygiene products, deodorant, hair spray, etc. Rinsing off in the shower for 60 seconds and wearing bathing caps significantly decreases the amount of total organic carbon and total nitrogen.<sup>17</sup></p> <p>A rinsing shower can be done in open showers with ambient temperature water.</p>
<i>Floor Sloped</i>	4.10.4.3.3	Floors of RINSE SHOWERS shall be sloped to drain waste water away from the venue and any landscaping areas if present. The intent is to prevent landscaping materials from being tracked back or washed into the pool area.
<i>Large Facilities</i>	4.10.4.3.4	The intent is to encourage BATHERS to see and use the showers before they enter the water.

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<sup>17</sup> Keuten MGA *et al.* Definition and quantification of initial anthropogenic pollutant release in swimming pools. *Water Res.* 2012;46:3682-3692

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<i>Beach Entry</i>	4.10.4.3.5	The intent of having at least four showerheads every 50 feet at a beach entry allows multiple people to rinse off at the same time. Showerheads could be provided as wall units, pedestals (one pedestal could have four showerheads or two pedestals could have two showerheads each), allowing AQUATIC FACILITY owners to have versatility in design.
<i>Leisure River</i>	4.10.4.3.6	BATHERS enter leisure rivers only in designated areas, therefore locating RINSE SHOWERS near these entrances facilitates rinsing before entering the leisure river.
<i>Waterslide</i>	4.10.4.3.7	BATHERS congregate into queue lines for access to waterslides. Providing a RINSE SHOWER on the deck of a queue line encourages use prior to entering the water.
<i>All Showers</i>	<b>4.10.4.4 All Showers</b>	
<i>Exceptions</i>	4.10.4.4.1	<p>The intent is to encourage use of showering prior to entering an AQUATIC VENUE. Large facilities, based on their BATHER LOAD, would require a large number of CLEANSING SHOWERS which would put an economic burden on these facility types. The MAHC acknowledges CLEANSING SHOWERS are more expensive to install than RINSE SHOWERS, therefore as long as the required number of showers is met, facilities can decide which type of shower is conducive for their patrons.</p> <p>In addition, the 2012 International Swimming Pool and Spa Code (ISPSC) Section 609.3.1 allows flexibility on the ratio of CLEANSING to RINSE SHOWERS above 7500 square feet of water surface area.</p>
<i>Diaper-Changing Stations</i>	<b>4.10.4.5 Diaper-Changing Stations</b>	
		<p>The material in this section addresses diapering of infants and young children. These are the age groups most commonly involved in contamination of recreational water that can lead to outbreaks of illness associated with recreational water. Although some older persons must wear diapers, the risk of infection from adults is much less than that from children and we do not believe that special regulations are needed for elderly BATHERS. Current DIAPER-CHANGING UNIT designs do not supply all the features needed for sanitary and efficient diaper changing and clean-up to minimize spreading pathogens further in the AQUATIC FACILITY.</p>

Keyword	Section	Annex
		<p>The MAHC defines a DIAPER-CHANGING STATION to include the following:</p> <ul style="list-style-type: none"> <li>• A DIAPER CHANGING UNIT,</li> <li>• An adjacent hand-washing sink,</li> <li>• Soap with dispenser,</li> <li>• Trash receptacle, and</li> <li>• Necessary cleaning materials for the DIAPER-CHANGING UNIT.</li> </ul>
<i>Hand Wash Station</i>	4.10.4.5.2	HAND WASH STATIONS are required adjacent to diaper changing stations to promote use after using the toilet/urinal or changing diapers. Facilities will have 1 year after adoption on this MAHC section to install a plumbed sink with soap and dispenser, hand drying device/or paper towels and dispenser, and trash receptacle.
<i>Portable</i>	4.10.4.5.3	If a permanently plumbed hand wash sink is not economically feasible to install, a portable HAND WASH STATION can be used as a substitute for one year. Portable hand wash stations are used at temporary events and include a water and waste tank that requires frequent refilling and draining for continual use.
<i>Conform</i>	4.10.4.5.4	<p>There appear to be two different configurations of DIAPER-CHANGING UNITS currently available and suitable for this setting. The first type, a fold-down commercial unit commonly mounted on the wall, is addressed by ASTM F2285-04 consumer performance standards for commercial DIAPER-CHANGING STATIONS. The second type, a free-standing unit, is addressed by <i>Caring for Our Children: National Performance Standards for Out-of-Home Child Care</i> (<a href="http://nrckids.org">http://nrckids.org</a>).</p> <p>A major difference between these two designs is that ASTM F2285-04 calls for restraining straps while CFOC prohibits the use of straps and relies on a 3 inch (8cm) lip to keep children from falling off. Both designs have inherent problems. The problems with straps are associated with cleaning and possible hanging hazard. The problem with a 3 inch (8cm) lip is that they are not available on fold-up units. The MAHC CODE language does not discriminate between these two designs, but whatever unit used should conform to one of these two standards.</p>

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Signage	4.10.4.5.5	Signage requirements were adapted from the diapering procedure laid out in CFOC. <sup>18</sup>
Unisex	4.10.4.5.6	Increasingly, many venues are providing family dressing areas and caregiver rooms to attend to family needs. This provision permits parents to attend to the needs of small children of the opposite sex.
Trash Can	4.10.4.5.7	Trash receptacles are needed to help maintain cleanliness around the DIAPER-CHANGING STATION for any disposable changing unit covers, diapers, sanitizing wipes, or disposable paper towels.
Non-Plumbing Fixtures	<b>4.10.4.6</b>	<b>Non-Plumbing Fixture Requirements</b>
Lockers	4.10.4.6.4	While some lockers are designed to sit directly on the floor, other lockers may need to be elevated. This prohibits water accumulation beneath the lockers. Such accumulation can lead to the growth of mold, mildew, and slime build up.
Dryers/Paper Towels	4.10.4.6.6	Hand drying devices or paper towel dispensers should be located adjacent to the hand-washing sinks to facilitate use. To prevent overcrowding, they may be positioned to move users away from the sink and toward the exit. In child care settings, the dispensers and devices are usually within arms reach of the sink.
Shared Equipment	<b>4.10.5</b>	<b>Provision of Suits, Towels, and Shared Equipment</b>
Adequate Space	4.10.5.1	Although providing reusable bathing suits is no longer common, many facilities provide patrons with towels and other shared equipment. The purpose of this standard is to ensure that these facilities provide adequate equipment and space in their design and construction for laundering, sanitizing and drying these items.
Foot Baths	<b>4.10.6</b>	<b>Foot Baths</b>
Prohibited	4.10.6.1	FOOT BATHS with standing water allow the buildup of organic

<sup>18</sup> American Academy Of Pediatrics, American Public Health Association, and National Resource Center for Health and Safety in Child Care and Early Education (2002). *Caring for Our Children: National Health and Safety Performance Standards; Guidelines for Out-of-Home Child Care Programs, 2nd edition*. Elk Grove Village, IL: American Academy of Pediatrics and Washington, DC: American Public Health Association. Available at <http://nrckids.org>.

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Keyword	Section	Annex
		material and bacterial and fungal growth and can lead to the spread of pathogens.
Sharps	<b>4.10.7</b>	<b>Sharps</b>
Container	4.10.7.1	<p>This section was included to address venues that provide patrons with sharps, especially razors, so that safe disposal is assured. Approved sharps containers are rigid, leak-proof, puncture resistant boxes of various sizes made of hard red plastic. They have a lid that can be securely sealed to keep contents from falling out, and they are clearly marked with the bio-hazard symbol. OSHA regulations describe the design and use of sharps containers for a variety of settings.</p> <p>Businesses are required by the Occupational Safety and Health Administration (OSHA) to deposit sharps into a sharps container that complies with OSHA regulations in order to protect employees. Once that container is full, it must be disposed of according to state and federal regulations.</p>

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## Model Aquatic Health Code Hygiene Facilities Module 5.0 Operation and Maintenance

Keyword	Section	Annex
	<b>5.0</b>	<b>Operation and Maintenance</b>
	<b>5.1</b>	<b>Plan Submittal</b>
	<b>5.2</b>	<b>Materials</b>
	<b>5.3</b>	<b>Equipment Standards</b>
	<b>5.4</b>	<b>Pool Operation and Facility Maintenance</b>
	<b>5.5</b>	<b>Pool Structure</b>
	<b>5.6</b>	<b>Indoor/Outdoor Environment</b>
	<b>5.7</b>	<b>Recirculation and Water Treatment</b>
	<b>5.8</b>	<b>Decks and Equipment</b>
	<b>5.9</b>	<b>Filter/Equipment Room</b>
<i>Hygiene Facilities</i>	<b>5.10</b>	<b>Hygiene Facilities</b>
<i>General</i>	<b>5.10.1</b>	<b>General</b>
	<b>5.10.2</b>	<b>Location [N/A]</b>
	<b>5.10.3</b>	<b>Bathhouse Design [N/A]</b>
	<b>5.10.4</b>	<b>Fixture Requirements</b>
	<b>5.10.4.1</b>	<b><i>General Requirements</i></b>
<i>Cleaned and Sanitized</i>	<b>5.10.4.1.1</b>	Toilets and showers should appear clean and ready to use to attract BATHERS to use them. <sup>19</sup>
		Although the MAHC is not aware of any work in this particular setting, studies in child care settings, schools, long term care facilities and food service establishments all support the importance of surface cleaning. The MAHC feels that daily cleaning at a minimum in this setting is reasonable for aesthetics as well as health and safety.
<i>Cleansing Showers</i>	<b>5.10.4.2</b>	<b><i>Cleansing Showers</i></b>
<i>Rinse Showers</i>	<b>5.10.4.3</b>	<b><i>Rinse Showers</i></b>

<sup>19</sup> Pool Water Treatment Advisory Group. Swimming pool water; Treatment and quality standards for pools and spas. 2nd edition, 2009. Micropress Printers Ltd.

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Keyword	Section	Annex
No Soap	5.10.4.3.4	Soap is not needed at RINSE SHOWERS because it can have a negative effect on pool chemistry.
All Showers	<b>5.10.4.4</b>	<b>All Showers</b>
Diaper-Changing Stations	<b>5.10.4.5</b>	<b>Diaper-Changing Stations</b>
Cleaned	5.10.4.5.1	It is the responsibility of patrons to clean diaper changing surfaces after each use. This is consistent with practice in other public settings where diapering takes place. However, staff should keep an eye on stations and clean when necessary.
Non-Plumbing Fixtures	<b>5.10.4.6</b>	<b>Non-Plumbing Fixture Requirements</b>
Floor Coverings	5.10.4.6.4	<p>Associations between swimming pools and disease outbreaks have been well documented in the literature. Though an outbreak has never been connected to the materials used specifically, wood and other porous materials have been shown to have bacterial growth on them that can be hard to remove.</p> <p>Non-porous materials used as matting at AQUATIC FACILITIES were found to be contaminated with bacteria and biofilm scum layers, although conventional cleaning was documented to remove the contamination.<sup>20</sup></p> <p>Biofilms are a complex collection of microbes that attach to a wet surface and form a scum layer that harbors bacteria and other microbes that could cause illness. Once established, biofilms provide a home for a variety of microbes such as <i>Pseudomonas</i> and are hard to remove. Biofilm-associated bacteria are much more resistant to hypochlorous acid compared to free swimming microbes. Design options to reduce biofilm formation as well as sanitizing systems with effective validation, could be useful for reducing biofilm formation.</p>
Shared Equipment	<b>5.10.5</b>	<b>Provision of Suits, Towels, and Shared Equipment</b>
Towels	5.10.5.1	The drying temperature is more important than the wash

<sup>20</sup> Davis TL, et al. Bacteriological analysis of indoor and outdoor water parks in Wisconsin. J Water Health 2009;7(3):452-463.

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Keyword	Section	Annex
Shared equipment Cleaned and Sanitized	5.10.5.3	<p>temperature when destroying potential pathogens. CDC recommendations for laundering entitled, "Environmental Cleaning &amp; Disinfecting for MRSA" can be found at <a href="http://www.cdc.gov/mrsa/environment/Laundry.html">http://www.cdc.gov/mrsa/environment/Laundry.html</a></p> <p>Research has demonstrated that play features, mat materials, and other shared equipment found at AQUATIC FACILITIES and water parks can harbor bacteria, even while submerged in chlorinated water. Damp materials that were not submerged in water contained the highest populations of bacteria. Damp play features designed for infants and toddlers were found to be likely vehicles for transference of gastrointestinal bacteria.<sup>19</sup></p> <p>Sanitization is defined as reducing the level of microbes that are considered safe by public health standards. This may be achieved through a variety of chemical or physical means including chemical treatment, cleaning, or drying.</p> <p>Associations between swimming pools and disease outbreaks have been well-documented in literature. Though an outbreak has never been connected to play features or the type of play feature material specifically, the possibility could exist due to biofilms found on these materials. Outbreaks may be more likely if the AQUATIC FACILITY is not maintained properly.</p> <p>Biofilms are a complex collection of microbes that attach to a wet surface and form a scum layer that harbors bacteria and other microbes that could cause illness. Once established, biofilms provide a home for a variety of microbes such as <i>Pseudomonas</i> and are hard to remove. Biofilm-associated bacteria are much more resistant to hypochlorous acid compared to free swimming microbes. Design options to reduce biofilm formation as well as sanitizing systems with effective validation, could be useful for reducing biofilm formation.</p>
Contact	5.10.5.3	<p>Shared equipment that contact mucous, saliva, eyes, or ears require sanitizing to prevent transmission of potential disease causing pathogens.</p>
Other	5.10.5.4	<p>Shared equipment which is hand held or used as a flotation device used in aquatic therapy or play have also been found to harbor potential harmful microorganisms,</p>

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even while submerged in properly chlorinated water. Bacteria found in these environments are most likely from biofilms that have attached to these surfaces. Soaking in disinfectants may not be enough to penetrate the biofilm; so to control biofilm growth, it is recommended to physically remove the slimy film by scrubbing equipment on a routine basis. The array of organisms isolated from damp features suggests that features need to be cleaned, SANITIZED, and thoroughly dried on a routine basis using a combination of chemical and physical methods, preferably as recommended by the manufacturer.<sup>19</sup>

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### ***A Note about Resources:***

*The resources used in all MAHC modules come from peer-reviewed journals and government publications. No company-endorsed publications have been permitted to be used as a basis for writing code or annex materials.*

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- 2000 International Building Code Section 1209.1
- ASTM F2285-04

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