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|  <p>澳門特別行政區政府<br/>         Governo da Região Administrativa Especial de Macau<br/>         衛生局<br/>         Serviços de Saúde</p> | <p>疾病預防及控制中心<br/> <b>Centre for Disease<br/>         Prevention and Control</b></p> | Document no.:   | 002.CDC-NHAA.GL.2005 |
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Updated version (click here)

## 1. Subject


These guidelines aim to regulate the standard values for indoor and outdoor artificial swimming pools, such as water quality and air quality, and their basic hygiene requirements.

## 2. Scope

- 2.1. These guidelines are applicable to all new, renovated, and expanded indoor and outdoor artificial swimming venues.
- 2.2. These guidelines are not applicable to natural swimming venues.
- 2.3. These guidelines do not impede the reasonable requirements imposed by the Health Bureau's Sanitary Authority for individual indoor and outdoor artificial swimming venues.
- 2.4. These guidelines do not impede other requirements, guidelines or regulations imposed by the competent authority.

## 3. Definition

- 3.1. The artificial swimming pools stated in these guidelines include:
  - 3.1.1. Swimming pools, which refer to pools of water used for swimming activities, including public swimming pools and private swimming pools that are open to the public, as well as diving pools, wading pools and paddling pools.
  - 3.1.2. Hot tubs, which refer to pools of water used for immersion bathing. Normally filled with water at a temperature higher than 32°C, they are designed to

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produce whirlpool jet and are not drained, refilled nor undergo any cleaning after each use. These tubs are also known as spa pools and whirlpool baths.

- 3.1.3. Plunge pools, which refer to pools of water used to cool the body. These pools are usually used in combination with hot tubs, saunas, and steam rooms and are subject to the same sanitary limits and monitoring standards as those which are applied to swimming pools.

## 4. Basic hygiene requirements and standards

### 4.1. Routine basic hygiene requirements:

- 4.1.1. Artificial swimming pools, passageways and sanitary facilities in artificial swimming venues must be kept clean and odourless and regular cleaning and disinfection should be carried out.
- 4.1.2. Water supply to artificial swimming pools must fulfil the quality standards for water supply for human consumption as stipulated in Annex 1 of the *Regulation of Water and Wastewater Drainage of Macao* approved via Decree-Law no.46/96/M on 19 August.
- 4.1.3. For the purpose of Item 4.1.2, a sampling water tap must be installed at the section of the water mains that leads directly to artificial swimming pools.
- 4.1.4. Water used in foot-soaking disinfection pools must contain a residual chlorine concentration of 5 - 10 mg/L and must be changed at least every 4 hours during opening hours.
- 4.1.5. During opening hours, swimming pools must be refilled with fresh water every day and the water must always reach the overflow point, so as to ensure good sanitary conditions for the pool water.
- 4.1.6. The number of swimming pool users must never exceed the rated capacity.
- 4.1.7. A clear sign must be placed at the entrance of artificial swimming venues to prohibit entry of drunken individuals and people with acute hepatitis, infectious


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skin diseases, trachoma, acute conjunctivitis and enteric infectious diseases.


4.1.8. Swimwear rental is strictly prohibited.

**4.2. Basic sanitary design requirements:**

- 4.2.1. New artificial swimming venues must be located away from sources of industrial pollution, and cause no disturbance to the surroundings.
- 4.2.2. Artificial swimming venues must be equipped with good ventilation and lighting facilities.
- 4.2.3. New, renovated, and expanded indoor and outdoor artificial swimming pools must be equipped with disinfection equipment and a water circulation system for purification purposes, which must be regularly maintained to ensure good operating condition.
- 4.2.4. Proper protective measures must be taken when using disinfectants.
- 4.2.5. Pool depth must be clearly indicated at an appropriate spot in the swimming pool or poolside area.
- 4.2.6. The sides and bottom of the swimming pool must be clean, light-coloured, and free of water leakage. Passageways outside the pool must not be slippery but easy to wash and must be equipped with drains at the outer edges to collect and drain wastewater into public sewers.
- 4.2.7. An appropriate number of shower heads should be installed at appropriate spots in the poolside area.
- 4.2.8. A compulsory foot-soaking disinfection pool is recommended to be installed in the middle of the passageway leading to the swimming pool (recommended pool dimensions: length >2 m, width same as that of the passageway, and depth of 20cm).
- 4.2.9. Artificial swimming venues must be equipped with separate changing rooms, shower rooms and washrooms for male and female users. Shower rooms must be equipped with an appropriate number of shower heads, and washrooms with

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an appropriate number of toilet bowls as well as toilet paper, wash basins, and disposable tissue paper or hand dryers. All wastewater in the shower rooms and washrooms should be collected and drained into public sewers.

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### 4.3. Recommended test items and their limits:


4.3.1. Sanitary limits for water quality in indoor and outdoor artificial swimming pools:

| Test item  | Limit  |
|--|--|
| Turbidity, NTU   | $\leq 1$   |
| Free residual chlorine <sup>§</sup> , mg/L Cl <sub>2</sub> | Swimming pools <sup>note</sup> : 1.0 - 3.0<br>Hot tubs <sup>note</sup> : 3.0 - 5.0                   |
| Bromine <sup>§</sup> , mg/L Br <sub>2</sub>                | 1.5 - 3.5  |
| Ozone <sup>§</sup> , mg/L O <sub>3</sub>                   | <0.1   |
| Cyanuric acid <sup>§</sup> , mg/L                          | Outdoor swimming pools: $\leq 100$<br>None should be detected for indoor swimming pools and hot tubs |
| Total bacteria count, /mL                                  | <200   |
| <i>E. coli</i> , /100mL                                    | <1   |
| <i>P. aeruginosa</i> , /100mL                              | <1   |
| <i>Legionella</i> <sup>*</sup> , /100mL                    | <1   |

<sup>§</sup> Tested depending on the composition of the disinfectant used for the swimming pool or hot tub in question.

<sup>note</sup>: The amount of free residual chlorine can be reduced when ozone or ultraviolet light is used together with chlorine.

<sup>\*</sup> The legionella test method and procedure must meet the existing world-recognized standards, such as ISO 11731.

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4.3.2. Monitoring requirements for water samples taken from artificial swimming pools:


i. Recommended minimum monitoring frequency for different test items:

| Test item                     | Recommended minimum monitoring frequency <sup>a</sup> |                |
|-------------------------------|---|----------------|
|                               | Swimming pools  | Hot tubs       |
| Pool temperature <sup>b</sup> | Once per day  | Once per day   |
| pH value <sup>b</sup>         | Twice per day   | Twice per day  |
| Turbidity                     | Once per day  | Once per day   |
| Free residual chlorine        | Twice per day   | Twice per day  |
| Total bacteria count          | Once per month  | Once per month |
| <i>E. coli</i>                | Once per month  | Once per week  |
| <i>P. aeruginosa</i>          | When necessary <sup>c</sup>                           | Once per week  |
| <i>Legionella</i>             | Once per quarter                                      | Once per month |

<sup>a</sup> Only applicable to swimming pools and hot tubs using chlorine as the main disinfectant; those disinfected using other methods should be tested for the relevant items based on the actual condition.

<sup>b</sup> To safeguard swimmers' safety and ensure disinfection efficiency, it is recommended that the water temperature should be no higher than 30°C for swimming pools and no higher than 40 °C for hot tubs to prevent heatstroke, and the pH value of the water should be maintained at 7.2 - 7.8.

<sup>c</sup> To be tested when there is evidence of pool maintenance problems (such as ineffective disinfection or abnormalities in filters or waterpipes), water quality deterioration, or health issues.

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### ii. Number of water samples and location:

| Area, m <sup>2</sup>      | Swimming pool  |        | Hot tub |
|---------------------------|--|--------|---------|
|                           | ≤1,000   | >1,000 |         |
| Number of sampling points | 2  | 3      | 1       |
| Sampling location         | Water samples collected 30cm below the water surface |        |         |

### 4.3.3. Standard values for air hygiene in indoor swimming venues:

| Item                              | Standard value                      |
|-----------------------------------|-------------------------------------|
| Indoor temperature in winter, °C  | 1 - 2 higher than water temperature |
| Relative humidity, %              | ≤80                                 |
| Carbon dioxide, %                 | ≤0.15                               |
| Air Bacteria Count                |                                     |
| a. Impaction, CFU/m <sup>3</sup>  | ≤4,000                              |
| b. Sedimentation, cells per plate | ≤40                                 |

## 5. References

- 5.1. World Health Organization (2006). Guidelines for safe recreational water environments. Volume 2, Swimming pools and similar environments.
- 5.2. National Standard of the People's Republic of China (2019). Hygienic design specification for public places—Part 3 : Artificial swimming place. GB 37489.3-2019.
- 5.3. National Standard of the People's Republic of China (2019). Hygienic indicators and limits for public places. GB 37488-2019.
- 5.4. Hong Kong Centre for Health Protection (2017). Guidelines on Infection Control of Commercial Spa Pools.