MOM/OSHD/2025-06
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19 November 2025

GUIDELINES ON THE USE OF CHEMICALS FOR DISINFECTION OF AQUATIC FACILITIES

This circular serves to provide guidance to aquatic facility (AF) licensees[1] on the safe use, storage and disposal of chemicals for disinfection of swimming pools, spa pools, and interactive water playgrounds.

2 Over the past few years, there have been incidents involving improper chemical handling in AFs leading to burns, exposure and even explosions. It is thus important to follow the proper procedures when handling pool chemicals – especially during dosing or disposal – to ensure safety and prevent accidents.

3 The National Environment Agency (NEA), Public Utility Board (PUB), Ministry of Manpower (MOM), Singapore Civil Defence Force (SCDF) and Singapore Police Force (SPF) urge AF licensees to implement the guidance provided in this circular. Additional reference information can also be found in SS556:2021 Code of practice for design and maintenance of aquatic facilities.

Chemicals used in AF water treatment

4 Chemicals are routinely added to AFs for microbial, scale, corrosion and pH controls. Common chemicals used in AFs for water treatment can be found in the table below.

Type of Chemicals	**Example of chemicals**
Chlorine-containing chemicals	Sodium / Calcium hypochlorite Sodium dichloroisocyanurates Sodium trichloroisocyanurates Sodium chlorate Sodium chlorite Trichloroisocyanuric acid
Acids and bases	Hydrochloric acid Dry acid Soda ash
Algicides	Copper-based algicide (copper sulphate)
Bromine-Containing Chemicals (for indoor AFs)	1-bromo-3-chloro-5,5-dimethylhydantoin (BCDMH) 1,3-dibromo-5,5-dimethylhydantoin (DBDMH)

[1] Environmental Public Health Act 1987 Part 7 Section 63

5 Chlorine-based chemicals are used to disinfect AF waters. However, their storage and handling demand strict safety precautions. Mishandling these substances can lead to spills and the release of toxic gases, notably chlorine gas, which poses serious health risks. Exposure to high concentrations may cause eye and respiratory irritation, choking, vomiting, chest pain, breathing difficulties, or even be fatal. Furthermore, these chemicals must never be illegally discharged into the sewerage system, as improper disposal can endanger public health and the environment.

6 Acids and bases used for pH control and efficient disinfection of AF waters are generally corrosive. Appropriate protective equipment must be worn when handling such chemicals. Acids and bases should be stored separately in a cool, dry, well-ventilated area away from direct sunlight and kept in their original containers with clear labels. Never mix different chemicals together, as this can create dangerous reactions and toxic gases.

Safe storage, handling and disposal of chemicals

Storage of chemicals

(1) Chemical storage and pump rooms should be well-ventilated. Flooding and seepage of water in these rooms should be prevented as the chemicals which may trigger chemical reactions upon contact with water.

(2) Chlorine-containing chemicals are incompatible with acids and must be stored separately with adequate segregation and measures to prevent accidental mixing. For liquid chemicals, bund walls or kerbs must be installed to contain any spills or leaks.

(3) All chemical containers must be properly labelled to identify chemicals, the hazards involved and the precautions to be taken. The labels are to be in accordance with Singapore Standard 586 Part 2: Globally Harmonised System of Classification and Labelling of Chemicals (GHS) - Singapore's adaptations.

(4) Hazard information for all chemicals in use, along with emergency contact numbers of AF owners, operators, and licensees, must be prominently displayed in a conspicuous location outside the chemical storage and pump room. An example of this required information is provided in the following table:

Chemical Name	Hazards	Emergency Contact Numbers
Sodium Hypochlorite/ Calcium Hypochlorite 	• Contact with acid liberates toxic gas – DO NOT MIX WITH ACIDS • Contact with water will cause dissolution and heat may be generated • May be corrosive to metal • Causes severe skin burns and eye damage	In any emergency, please contact *XXX* at Tel: *XXXXXXXX*
Hydrochloric Acid/Dry Acid 	• Fatal if inhaled • Toxic if swallowed • Toxic in contact with skin • Causes severe skin burns and eye damage	
Soda ash (Sodium Carbonate 	• Harmful if swallowed, in contact with skin, inhaled • Causes skin, eye and respiratory irritation	
Copper-based algicide (copper sulfate) 	• Causes skin irritation • May cause an allergic skin reaction • Causes serious eye irritation	
Bromine-containing disinfectants 	• Fatal if inhaled • Toxic if swallowed • Toxic in contact with skin • Causes severe skin burns and eye damage	

Safe handling of chemicals

(1) Risk assessment must be conducted for the work activities carried out at the AF premises, including identifying the chemical hazards, assessing the exposure to persons in the work areas or within the AF, and the precautionary measures to be taken to control the risks.

(2) Safe work procedures must be established and documented to ensure AF operations are conducted safely. These procedures must include, but are not limited to the measures in this circular.

(3) All hazardous substances[2] used at the premises must be placed under the control of a competent person[3] possessing adequate knowledge of their properties and associated dangers.

(4) Only trained[4] workers may handle chemicals. They must be trained on the hazards involved and the precautions to be taken when handling chemicals. Safety Data Sheets (SDS) provided by manufacturers or suppliers contain essential information on safe chemical handling. SDS copies must be readily accessible in all work areas where chemicals are used, handled, or stored.

(5) AF water treatment chemical inventory should be maintained at minimum levels for operational needs.

(6) All AF cleaning chemicals and treatments must be used solely for swimming pool maintenance purposes and not for any other uses.

(7) All pipelines for the AF chemical dosing system must be correctly labelled with name of contents.

(8) Inlet couplers used for loading chlorine-containing chemicals and hydrochloric acid in liquid form should be clearly labelled and of different sizes or coupler types, to avoid wrong connections and inadvertent chemical reactions.

(9) Chemical loading and dosing preparation for AF water treatment must be scheduled during off-peak hours whenever possible. If this is not feasible, additional safety measures must be implemented to keep out unauthorised personnel from entering the work area.

(10) Chemical refilling/dosing activity must be supervised by the facility management staff engaged by AF licensees who understand the hazards and precautionary measures to be taken when handling chemicals. Approval for chemical procurement, usage and disposal should be sought,

[2] Hazardous substances as specified in Part II of the Fifth Schedule of Workplace Safety and Health Act

[3] Competent person is one who has attained competency in WSQ Manage Hazardous Substances course, or equivalent.

[4] An example of such training is the "Swimming Pool Maintenance & Operation" course jointly organised by Singapore Environment Institute and Institute of Technical Education. More information can be found at: http://www.ite.edu.sg/cet/sc/outlines/Swim_Pool_Maint_Opn.pdf

and records should be kept. ***[Appendix A provides guidelines on proper dosing of chemicals into the AF.]***

(11) AF licensees should inform AF users in advance of planned pool maintenance works. For manual dosing, licensee shall ensure that the AF is free of any users for safety reasons.

(12) Institute a reporting system for near misses, incidents or accidents to supervisors or relevant persons-in charge, with escalation to relevant authorities when the event becomes more severe.

Disposal measures

(1) Water treatment chemicals such as chlorine-containing chemicals and acids, etc. must not be disposed into the sewerage system.

(2) Only backwash from AF filters can be discharged into the public sewerage system.

(3) Dispose unused or unwanted chlorine-containing chemicals in accordance with the procedures in the SDS. Alternatively, NEA's licensed toxic industrial waste collectors could be engaged to assist with the disposal of chemicals.

(4) There shall be no unauthorised opening of inspection chambers of sanitary systems and sewage manholes of the public sewerage system. Inspection chambers and manholes should always remain closed.

Security measures

(1) Blind flange or caps secured with a padlock or other security devices should be installed at the inlet of the chemical loading lines. The keys to the padlocks or devices are to be kept by authorised persons[5].

(2) Access to chemical storage and pump rooms must be restricted to authorised persons[5] only.

(3) Chemical / pump room doors should have a double locking system. If the door only has one locking device, an additional latch-padlock device should be installed.

(4) A proper key management system to the chemical storage and pump room should be established, including
- Procedures for key issuance
- Protocols for reporting lost keys
- Maintenance of a key register
- Accountability measures for key whereabouts.

[5] The authorized person refers to individuals who have been officially granted permission, clearance, or authority to perform specific duties or access certain areas.

(5) AF licensees are advised to install a CCTV system, to monitor access into the chemical storage and pump room, as well as to deter and detect suspicious activities. CCTV specifications must adhere with SPF's Video Surveillance System (VSS) standards for buildings, including:

- Camera resolution: 1920 x 1080 pixels
- Minimum frame rate: 6 fps (indoor), 12 fps (outdoor)
- Minimum video archival capacity: 31 days with an additional 10% buffer.

Duties and Responsibilities of AF licensees, occupiers and employers

7 AF licensees shall ensure that only approved chemicals are used for disinfecting the water in licensable AFs, and their appointed pool maintenance contractor:

- possesses the necessary expertise to carry out the work
- has conducted a risk assessment in relation to the safety and health risks
- has taken adequate safety and health measures

8 Workplace occupiers[6] must take measures to ensure that the workplace, machinery, equipment, plant, article or substance kept on the workplace are safe and without risks to health to every person within the premises.

9 Employers[6] must take measures to ensure the safety and health of his employees at work as well as the safety and health of persons who may be affected by any work carried out by him in the workplace. Employers must conduct a risk assessment in relation to the safety and health hazards associated with any routine and non-routine work carried on at the workplace, identify the hazards, determine the risk involved and take measures to eliminate or minimise the risk.

10 Workplace occupiers and employers are required to report accidents, dangerous occurrences and occupational diseases that occur in the workplace. This is mandatory under the WSH (Incident Reporting) Regulations. For all cases, notify the Commissioner for WSH via MOM's website on WSH Incident Reporting (https://www.mom.gov.sg).

11 Should you need further information, please contact:

- NEA at **1800 CALL NEA (1800 2255 632)** for disinfection levels of chlorine in the AF water and for notification of incidents involving the release of chlorine gas.
- MOM at **6317 1111** for any significant health and safety concerns of employees.
- PUB, Singapore's National Water Agency, at **1800-CALL-PUB (1800-2255-782)** for advice on sanitary drainage and plumbing system maintenance and sullage water discharge into the public sewerage system.
- The nearest Fire Station for assistance on emergency response plan.
- The nearest Neighbourhood Police Centre for advice on security matters.

12 Other useful references on chemical management and security measures, you may refer to the following:

- SS 556:2021: Code of practice for design and maintenance of aquatic facilities
- SS 586-2:2022 Specification for hazard communication for hazardous chemicals and dangerous goods – Part 2: Globally harmonised system of classification and labelling of chemicals – Singapore's adaptations
- WSH Guidelines on Management of Hazardous Chemicals Programme

[6]Refer to definition under the Workplace Safety and Health (WSH) Act (https://sso.agc.gov.sg/Act/WSHA2006)

- Video Surveillance Standards (https://www.police.gov.sg/~/media/05398B3543CD4A97B8D6422B9E595A1B.ashx)
- Guidelines for Building Security

bldg_security_guide.pdf

This circular is jointly issued by NEA, PUB, MOM, SCDF and SPF.

Appendix A
Dosing of chemicals into the aquatic facilities (AF)
(in consultation with Swimming Pools & Aquatic Association of Singapore, SPAA)

The dosing of chemicals into the AFs shall be primarily done via the automated chemical dosing system for AFs built from 2022 onwards.

For older AFs that are practising manual dosing of chemicals, the dosing shall be done when the AFs are not occupied. Signage(s) indicating that chemical dosing is in progress should be placed in the vicinity of AF where dosing is carried out to warn AF users of ongoing works. Improper dosing procedure may result in explosions and the production of chlorine gas.

Chemicals shall be dosed directly into the balancing tank or into the overflow channel at the point nearest to where the water returns to the balancing tank. The water flow should be fast and turbulent to ensure that the chemicals may be rapidly and fully diluted without any residual chemicals in the overflow channel. To maintain the water flow in the overflow channel, the channel has to be free from debris such as fallen leaves. For skimmer pools, the dosing of chemicals is done directly into the skimmer basket. Be aware that insufficient water or dosing the inappropriate chemical in the overflow channel or skimmer basket may result in explosions and the production of chlorine gas.

Step-by-step guide on the manual dosing of chemicals:

1. Test the quality of the swimming pool water to determine the current pH, current free chlorine level. Based on the size of the pool and the test results, select the most suitable pool disinfecting chemical and the amount required.

    a. Example: to increase 1 ppm of Chlorine in 400 m^3 of water,
        i. Use of 100% of Chlorine-based disinfectant: it needs 400g
        ii. Use of 90% of Chlorine-based disinfectant: 400/0.9=444g
        iii. Use of 70% of Chlorine-based disinfectant: 400/0.7=571g

2. Ensure sufficient clearance distance from the dosing site, to prevent accidental spillage and exposure to user/public. The appropriate clearance distance should be determined through a site-specific risk assessment, considering the nature of the chemicals and dosing process. If possible, set up a barricade around the dosing site;

3. Put up the warning signage to inform passerby of pool maintenance activities

4. Ensure that there is sufficient water in the dosing point;

5. Ensure sufficient ventilation[7] and stay upwind of the dosing site;

6. Gradually add the solid disinfectant (in the form of powder, granule or pellet) in small amounts to water (not the other way round);
7. Never mix different chemicals together in the same bucket, as it can lead to dangerous reactions. Dissolve each chemical separately in a clean bucket with a large amount of water;

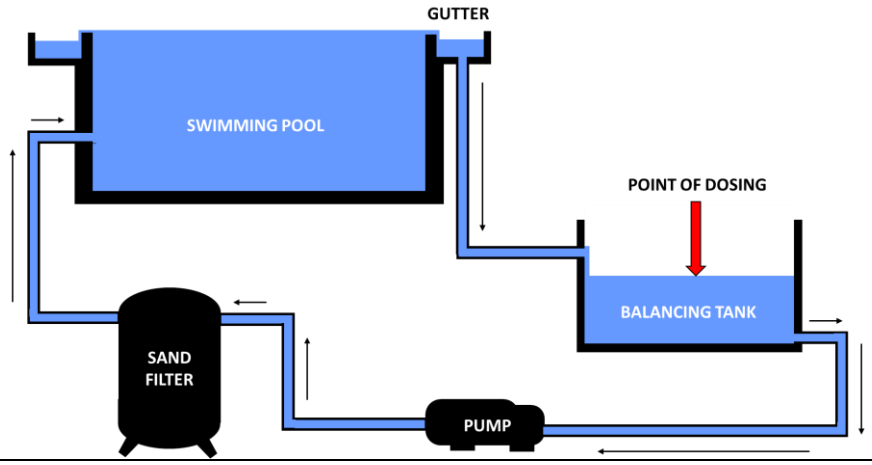
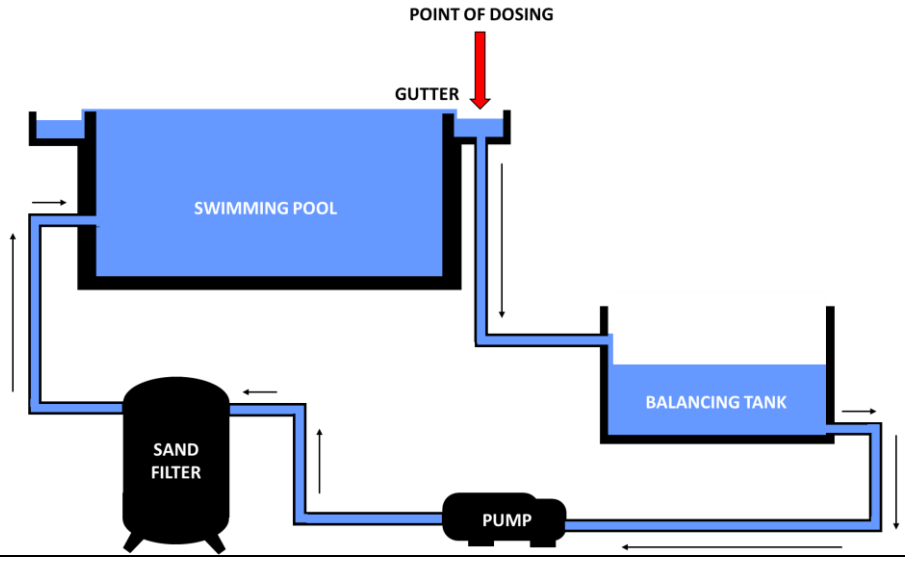
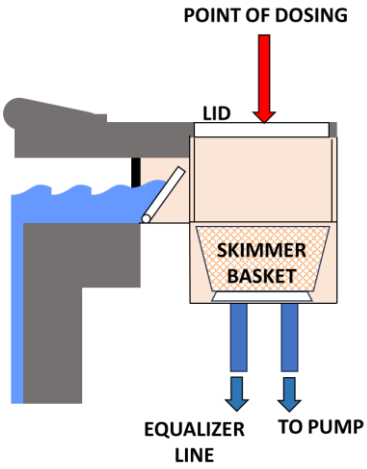
[7] The minimum ventilation rate shall be in accordance with the relevant guidelines available within SS 556 Code of Practice for The Design and Management of Aquatic Facilities

8. For dosing at overflow channel / drain, ensure the chemical(s) is flushed away fully and clean up any remnants of the chemical scattered in the area before leaving the dosing site.

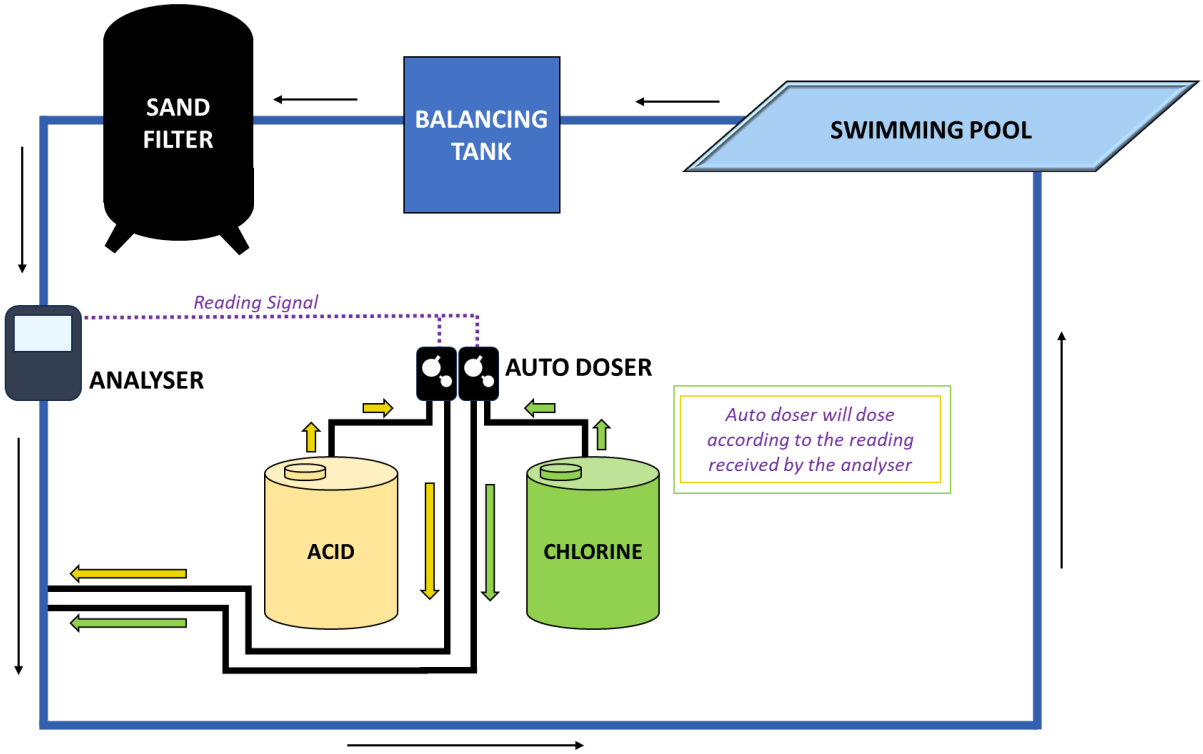
For licensable AFs, please be reminded that it is the licensee's responsibility to ensure that only approved chemicals (non-gaseous chlorine-based disinfectant and non-gaseous bromine-based disinfectant) are used for the purpose of disinfecting the AF water and the water quality comply with the regulatory parameter limits stipulated in the Environmental Public Health (Licensable Aquatic Facilities) Regulations 2021 at all times.

Infographic

Dosing points for AF chemicals

S/N	Dosing Point
1.	Balancing tank 
2.	Overflow system 
3.	Skimmer system 

Example of working principle for automatic chemical doser



Duties & responsibilities of aquatic facility licensee on pool chemicals