

GUIDELINES ON THE USE OF CHLORINE-CONTAINING CHEMICALS FOR DISINFECTION OF SWIMMING POOLS

This circular serves to provide guidance to swimming pool operators and owners on the safe use and disposal of chlorine-containing chemicals for disinfection of swimming pools. It supersedes the joint circular issued by MOM, NEA, SCDF and SPF on 19 July 2011.

Storage, handling and disposal of chemicals

2. Chlorine-containing chemicals are commonly used in swimming pools as part of the routine water treatment. While such chemicals help to disinfect the water, care must be taken to ensure that they are used in a safe manner as improper storage and handling of these chemicals may result in spills and release of chlorine gas. Chlorine gas can irritate our eyes and lungs, and inhalation of chlorine in higher concentrations may result in choking sensations, vomiting, chest pain and difficulty in breathing. Care must also be taken to ensure that chemicals are not illegally disposed of into the sewerage system.

Safety and security measures

3. The National Environment Agency (NEA), PUB, Singapore's National Water Agency, Ministry of Manpower (MOM), Singapore Civil Defence Force (SCDF) and Singapore Police Force (SPF) would like to advise swimming pool operators and owners, who use chlorine-containing chemicals (such as sodium / calcium hypochlorite) for disinfection, and acids (such as hydrochloric acid) for pH adjustment of pool water, to implement the following measures where relevant.

Safety measures

- (1) Risk assessment has to be conducted for the work activities carried out at the swimming pool premises, including the hazards of the chemicals handled within the premises and the precautionary measures to be taken when handling chemicals.
- (2) Safe work procedures should be established and documented to facilitate swimming pool operations in a safe manner. The procedures must include but not limited to the following:
 - a. Measures to be taken to safeguard the health and safety of persons handling chemicals e.g. during dispensing of chemicals, preparation of dosing chemicals and treatment of unused chemicals for disposal if required.
 - b. Emergency response for chemical spillage and leaks
 - c. Disposal of unused and unwanted water treatment chemicals
 - d. Information on the contact numbers of the relevant persons in charge and the responding authorities.

- (3) All hazardous substances¹ used at the premises are to be placed under the control of a competent person² who has adequate knowledge of the properties of the hazardous substances and their dangers.
- (4) The inventory of swimming pool water treatment chemicals should be kept to a minimum.
- (5) All chemical containers must be properly labelled to indicate the identity of the chemicals, the hazards involved and the precautions to be taken. The labelling should be in accordance with Singapore Standard 586 Part 2: Globally Harmonised System of Classification and Labelling of Chemicals (GHS)-Singapore's adaptations.
- (6) Only trained³ workers are allowed to handle chemicals. They must be trained on the hazards involved and the precautions to be taken when handling chemicals. Information on safe handling of the chemicals can be found in the Safety Data Sheets (SDS) of the respective chemicals – provided by the manufacturers or the suppliers of the chemicals. Copies of the SDS must be provided and made readily accessible to persons at work areas where the chemicals are used or handled.
- (7) Inlet couplers used for loading of chlorine-containing chemicals and hydrochloric acid in liquid form should be of different sizes or coupler types to avoid wrong connection and be properly labelled.
- (8) All pipelines for the swimming pool chemical dosing system are correctly labelled with name of contents.
- (9) Chlorine-containing chemicals (sodium / calcium hypochlorite, sodium dichloroisocyanurates, sodium trichloroisocyanurates, sodium chlorate, sodium chlorite or others) are incompatible with acids and should be stored separately with adequate segregation and measures to prevent accidental mixing. Bund walls or kerbs should be erected for liquid chemicals to contain any spill or leak.
- (10) Chemical storage / pump rooms should be well ventilated. Flooding and seepage of rainwater in these rooms should be prevented as water may come in contact with the chemicals which may trigger chemical reactions. Hazard information on the chemicals used and the emergency contact numbers of the swimming pool owners / operators should be duly posted at a conspicuous area outside the chemical storage / pump room. An example of the information to be displayed is shown in the following page.

¹ Hazardous substances as specified in Part II of the Fifth Schedule of Workplace Safety and Health Act

² Competent person has to attain competency in WSQ Manage Hazardous Substances course or equivalent.

³ 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

Chemical Name	Hazards	Emergency Contact Numbers
Sodium Hypochlorite/ Calcium Hypochlorite	<ul style="list-style-type: none"> • 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 times of emergency, please contact XXX at Tel: XXXXXXXX
Hydrochloric Acid	<ul style="list-style-type: none"> • Fatal if inhaled • Toxic if swallowed • Toxic in contact with skin • Causes severe skin burns and eye damage 	

- (11) Loading of swimming pool water treatment chemicals and preparation of dosing chemicals should as far as possible be carried out during non-peak hours.

Disposal measures

- (1) The disposal of unused or unwanted chlorine-containing chemicals should be carried out 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 the chemicals.
- (2) Unused or unwanted water treatment chemicals such as chlorine-containing chemicals and acids, etc. cannot be disposed into the sewerage system.
- (3) No unauthorised opening of inspection chambers of sanitary system and sewage manholes of public sewerage system is allowed. Inspection chambers and manholes should always be closed.
- (4) Only backwash from swimming pool filter can be discharged into the public sewerage system.

Security measures

- (1) Blind flange or caps secured with a padlock or other secured devices should be installed at the inlet of the chemical loading lines. The keys should be kept by authorised persons.
- (2) Only authorised persons have access to the chemical storage / pump room.
- (3) The doors to the chemical / pump room should have a double locking system. If the door only has one locking device, an additional latch-padlock device is to be fitted onto the door.

- (4) A proper key management system to the chemical storage / pump room should be established to ensure that the whereabouts of the keys are properly recorded and accounted for, e.g. establishing procedures for key issuance, report loss of keys, keys register book etc.
- (5) Any chemical refilling activity must be supervised by the facility management staff engaged by swimming pool owners / operators who understand the hazards and precautionary measures to be taken when handling chemicals. Approval for chemical procurement, usage and disposal should be sought and records should be kept.
- (6) Swimming pool owners / operators are advised to install a CCTV camera to monitor access into the chemical storage / pump room, for deterrence and detection of suspicious activities. The specification of the CCTV should adhere to the SPF's Video Surveillance System (VSS) standards for buildings, specifically on the camera resolution of 1920 x 1080 pixels, a minimum frame rate of 6 fps for indoor (12 fps for outdoors) and footage to be recorded with a minimum video archival capacity of 28 days and an additional buffer of 10%.

Duties and Responsibilities of swimming pool operators and employers

4. Swimming pool operators (workplace occupier) 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. Employers 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 on by him in the workplace.
5. 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. This is required under the WSH (Risk Management) Regulations.
6. 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 (<http://www.mom.gov.sg>).
7. Should you need further information, please contact:
 - NEA at **1800 CALL NEA (1800 2255 632)** for disinfection levels of chlorine in the swimming pool water and for notification of incidents involving the release of chlorine gas.
 - MOM at **6317 1111** for safety and health of workers.
 - 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.
8. Other useful references on chemical management and security measures, you may refer to the following:

- WSH Guidelines on Management of Hazardous Chemicals Programme
- The Chlorine Institute
- Video Surveillance Standards
(<https://www.police.gov.sg/~media/05398B3543CD4A97B8D6422B9E595A1B.ashx>)
- Guidelines for Building Security



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This circular is jointly issued by NEA, PUB, MOM, SCDF and SPF on 19 May 2021.