

SINGAPORE STANDARD

Code of practice for water services

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Annex A (normative)

Disinfection of installation

A.1 Inspection, cleaning and disinfection of water storage tanks

A.1.1 Inspection and cleaning procedures

A.1.1.1 The inspection and cleaning of water storage tanks shall be undertaken by a licensed water service plumber.

A.1.1.2 Before the commencement of any cleaning and disinfection work, the licensed water service plumber shall notify the Authority on prescribed forms of the work to be carried out.

A.1.1.3 Before the commencement of any inspection or cleaning and disinfection work on the water storage tank, the owner or his authorised representative shall turn off power supply to the water tank. The licensed water service plumber shall place a log-out/tag out card at the switchboard after the power supply to the tank has been switched off. The licensed water service plumber shall use a contactless voltage meter to test the exposed areas on the water tank to confirm that it is safe to inspect and work on and in the tank before he proceeds with his inspection/work. All persons involved in the inspection and cleaning and disinfection work shall use proper rubber gloves and safety shoes. On completion of inspection and cleaning and disinfection work, the licensed water service plumber shall remove the log-out/tag out card at the switchboard and the owner or his authorised representative shall then turn on power supply to the water tank. The licensed water service plumber shall use a contactless voltage meter to again test the exposed areas on the water tank to confirm that it is safe electrically.

A.1.1.4 Before the commencement of any cleaning and disinfection work, a joint inspection with the owner or his representative shall be carried out to check on the condition of the water storage tank (including its associated fittings such as the overflow pipes, air vents, nettings, tank manhole covers, etc. and ancillary equipment).

A.1.1.5 All remedial works to the tank and its associated fittings and ancillary equipment arising from the joint inspection shall be carried out before commencement of cleaning work. Before the commencement of any cleaning and disinfection work, adequate notice should be given to consumers and adequate signboards shall be displayed to indicate that the water tanks are undergoing cleaning and disinfection.

A.1.1.6 The water in the tank shall be used to around 150 to 200 mm above the bottom of the tank before the tank is isolated and the outlet pipes shut off.

A.1.1.7 The external of the tank and the tank manhole covers shall be cleaned before the tank covers are opened.

A.1.1.8 All tank manhole covers shall be opened to admit light and for ventilation and access. It shall be ensured that the tank is isolated and all outlet pipes are shut.

A.1.1.9 It is presupposed that installations are in compliance at all times with statutory safety requirements, as well as other necessary and safety measures, to ensure that it is safe to enter the tank.

A.1.1.10 All workers involved in the cleaning work shall be certified by a medical doctor to be free from water-borne diseases. Workers should be vaccinated or immunised against water-borne diseases such as typhoid, cholera and infectious hepatitis.

A.1.1.11 The licensed water service plumber shall ensure that all workers involved in the cleaning work are not feeling unwell before carrying out the cleaning work. All workers involved in the cleaning work shall wash, clean and disinfect themselves thoroughly before entering the tank.

A.1.1.12 All workers involved in the cleaning work shall observe safety measures at all times and shall be properly equipped with the necessary safety equipment and gear.

A.1.1.13 Equipment and tools used shall not have sharp edges that may damage the inside of the tank. The equipment and tools shall be exclusively used for the cleaning of potable water tanks only and shall be disinfected before every use.

A.1.1.14 To prevent sludge and sediments from entering the outlet pipes, all outlets of these pipes shall be covered.

A.1.1.15 The internal of the tank including the floors, walls, roof, internal of the tank manhole covers, etc. shall then be cleaned using appropriate methods such as scrubbing, pressure jet, etc., Sediments and solids shall be collected in containers for disposal at authorised dumping grounds.

A.1.1.16 The roof and sides of the tank walls above the overflow level shall be cleaned and disinfected too. Chlorine solution of 200 mg/litre shall be applied onto the internal surfaces of the roof and sides of the tank walls above the overflow level (by spraying or brushing) and left there for at least 30 min after they have been cleaned and washed.

A.1.1.17 The entire tank (including the roof and sides of the tank walls above the overflow level) shall be thoroughly washed and flushed until it is clean and free from dirt, solids, chemicals or other foreign matter which may affect the quality of water stored and supplied to consumers.

A.1.2 Disinfection procedure

A.1.2.1 The disinfection of water storage tanks shall be undertaken by a licensed water service plumber.

A.1.2.2 After cleaning, potable water is fed into the cleaned tank up to overflow level. Disinfecting chemical in solution form containing chlorine shall be gradually added while the tank is being filled to ensure thorough mixing. Safety procedures for the handling of such chemical shall be observed at all times. Introduction of the disinfecting chemical into the tank in powder form is not allowed.

A.1.2.3 The chemical concentration for disinfection of the tank shall be 50 mg/litre of free chlorine (i.e. 50 ppm of free chlorine). Ordinary 'bleaching powder' in solution form or a sodium hypochlorite solution with an equivalent concentration may be used.

A.1.2.4 While the water in the tank is being disinfected, all outlet pipes from the tank shall be closed tight and no water shall be allowed to flow into these pipes as the water under disinfection may not be safe for human consumption.

A.1.2.5 The disinfected water shall be kept in the tank for at least 24 h. The water in the tank is then drained off completely through the wash-out pipe and the tank refilled with potable water through the inlet pipe. It shall be ensured that all outlet pipes are closed tight before refilling the tank with potable water.

A.1.2.6 Water samples shall then be taken from the tank sampling tap for bacteriological and chemical analyses at a SAC-SINGLAS-accredited laboratory. In the absence of a tank sampling tap, water samples shall be taken from the bottom of the tank using an appropriate sampling device.

A.1.2.7 Water samples shall be taken by a licensed water service plumber and should be sealed and marked by the owner or his representative and escorted to the SAC-SINGLAS-accredited laboratory.

Alternatively, the water samples may be taken by personnel from the SAC-SINGLAS-accredited laboratory and sealed and marked by the owner or his representative. Water samples with broken seals shall be rejected.

A.1.2.8 The tank and the water shall only be put into use after satisfactory test reports are obtained from the SAC-SINGLAS accredited laboratory. All downfeed and distributing pipes from the tank shall be thoroughly flushed until clean before water from the tank is put into use.

A.1.2.9 If the test reports from the SAC-SINGLAS accredited laboratory are unsatisfactory, disinfection shall have to be carried out again.

A.1.2.10 After cleaning and disinfection have been completed, a final joint inspection with the owner or his representative to check on the condition of the water tank shall be carried out to ensure that all remedial works have been carried out and all tank openings (such as air vents, overflow and warning pipes, etc.) have been properly screened to prevent birds, insects and other possible contaminants from entering the water tank.

A.1.2.11 Upon completion of cleaning and disinfection work, the licensed water service plumber shall notify the authority on prescribed forms of the completion of work accompanied with the laboratory water sample test reports within the time period stipulated by the Authority.

A.1.2.12 Only in cases where the tank cannot be shut down for 24 h or more, the following disinfection procedure may be used:

A.1.2.13 Observe procedures A.1.2.1 to A.1.2.11 and add sufficient chemicals to give the water a dose of 200 mg/litre of free chlorine, keep the disinfected water in the tank for at least 2 h before draining off completely.

A.1.2.14 Following the draining and refilling to overflow level, the tank and water can be put into use. On-site testing of the chlorine concentration in the water in the tank shall be carried out to ensure that the chlorine concentration is satisfactory before the tank and water are put into use. All downfeed and distributing pipes from the tank shall be thoroughly flushed until clean before water from the tank is put into use.

A.1.2.15 Water samples shall be taken at the same time and sent to a SAC-SINGLAS-accredited laboratory for bacteriological, chemical and heavy metal leaching analyses. If the test reports from the SAC-SINGALS accredited laboratory are unsatisfactory, disinfection shall have to be carried out again.

A.1.2.16 The use of any other disinfecting chemical other than chlorine for the disinfection of water storage tanks is allowed only if the chemical and its application procedures have been approved by the Authority. Similarly, the use of any other cleaning or disinfection procedures is allowed only if the procedures have been approved by the Authority.

A.2 Procedure for disinfection of water service pipes

A.2.1 Disinfection of water service pipes shall be undertaken by a Licensed Water Service Plumber.

A.2.2 Before commencing the disinfection of water service pipes, adequate signboards shall be displayed to indicate that the service pipes are undergoing disinfection and that the water shall not be consumed.

A.2.3 The pipelines shall be thoroughly and adequately flushed and drained.

A.2.4 The chlorinating system is then connected to the water service pipes at the proposed meter position.

A.2.5 The chlorinating system shall consist of a water tank in which the disinfecting chemical containing chlorine and water (from temporary supply) are mixed to give a concentration of 50 ppm of free chlorine. The chlorinated water is then pumped into the service pipes by using suitable chemical feed pumps for feeding chlorinated water.

A.2.6 When all the service pipes have been filled, the chlorinated water shall be maintained in the system for 24 h.

A.2.7 The chlorinated water shall be drained away and the pipeline flushed and filled with potable water.

A.2.8 Water samples shall be taken for bacteriological and chemical testing by SAC-SINGALS-accredited laboratories.

A.2.9 The flushing and sampling shall be repeated over the next two days. Pipeline can be commissioned after two consecutive tests mentioned in A.2.8 are satisfactory; otherwise the disinfection procedure shall be repeated.

A.2.10 Prior approval on the use of any other disinfecting chemicals and of its application procedures for the disinfecting of water service pipes shall be obtained from the Authority.