Health & Safety Department

(Environmental Health Section)

Document Title	**Technical Guidelines for Quality of Unbottled Drinking Water**
Document Code	DM-HSD-GU17-DW2
Version #	V1
Issue Date	25th September 2024
Superseded Issue Date	New

Version #	Date	Prepared/reviewed by	Modifications summary
V 1.0	25th September 2024	Environmental Health Section	Issue - Version 1

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1 Introduction

Drinking water is of utmost importance due to its great impact on human health, whether it is used for direct drinking, food and beverages preparation, or using it for entertainment or other purposes inside and outside built environments. From this standpoint, the Health and Safety Department has adopted an ambitious plan for comprehensive control of unbottled drinking water, of all kinds in the Emirate of Dubai to ensure its safety and quality and made it a strategic goal that it seeks to achieve and reduce the health risks of drinking water pollutants, namely:

Microbiological risks or microbial contamination, which is the most common and widespread risk associated with drinking water, such as shigella, salmonella, Escherichia coli, cholera, and other microbiological pollutants. These organisms may cause diseases that vary in severity from moderate inflammation of the stomach and intestines to severe and sometimes fatal symptoms of dysentery or and typhoid fever, as well as other organisms, such as S. aeruginosa, may cause infections that include the skin and mucous membranes of the eyes, ear, nose, and throat, especially patients and weak immunity, and these diseases are transmitted by consuming contaminated water.

In addition to chemical hazards that have the potential to cause harm to health after long periods of exposure, for example , exposure to high levels of fluoride, which occurs naturally, can lead to yellowing of the teeth, and in severe cases to injury to the skeleton with fluorescent disease and can, likewise, produce arsenic naturally and excessive exposure to arsenic in drinking water may lead to a significant risk of cancer and skin ulcers as well as other chemicals produced naturally, including uranium and selenium, the use of unapproved pipes, fitting and water pipes can lead to the emergence of high levels of chemicals that cause diseases that harm human health and may cause death, especially due to prolonged exposure or accidental pollution.

2 Purpose

Enhancing transparency in water quality monitoring methods and thus building public confidence in unbottled drinking water and ensuring through regular monitoring that the quality of water provided meets quality standards and requirements ،creating awareness and communication between building owners, water service providers, consumers, and the municipality, and ensuring a minimum water quality control standard.

This guide is related to the quality standards of unbottled drinking water intended for human use, and its aim is to ensure that the consumer is able to obtain safe and healthy drinking water, which contributes to maintaining the health and safety of drinking water users in the Emirate of Dubai.

The guide contains information on limiting bacterial and microbiological growth in water systems, water quality standards to be measured, operational monitoring and reporting of non-conforming results, corrective actions for those non-conforming results, in addition to a water safety plan, risk assessment in multiple water systems, and best practices in monitoring control of unbottled drinking water.

3 Scope

This guide is applicable to unbottled potable water intended for drinking and its distribution systems in all built environments including but not limited to hotels, non-medical professional service providers' buildings, educational institutions ،nurseries, schools, commercial, governmental, and residential buildings, labor cities, fitness centers, sports clubs, barbershops and massage centers, etc., and it also applies to companies, tankers, and suppliers of unbottled drinking water, in addition to ice and its manufacturing system in those constructed environment in addition to ice and its manufacturing systems in those built environments, in addition to companies that cleaning and disinfecting water systems and private laboratories that test water.

4 Definitions

Definition	Meaning
Regulatory Authority	Health and Safety Department - Environmental Health and Safety Section - Dubai Municipality.
Concerned Parties	Federal and local the authority's, relevance, and scope Geographical (each within his field of competence)
Accredited Laboratory	A laboratory accredited by the Emirates International Accreditation Center "EIAC" according to the requirements of the international standard ISO / IEC 17025 in the field of drinking water testing.
Cleaning	Remove dirt, sediment, algae, or other contaminants from water tanks, cleaning filters, delivery pipes, water purification filters ،and other systems to maintain safety and quality. stored drinking water
Consumer	The person to whom the distribution company supplies water for domestic, commercial, industrial, and agricultural purposes.
Owner Building	Owner or Manager or representative or authorized Legally, management or employment or investment The building.
Water	Unbottled drinking water
Unbottled drinking Water	Water suitable for human consumption and supplied through the public network, the limited distribution network, wells, springs, or from any other source of surface water used for drinking, to which all the criteria mentioned in this guide apply.
Water Tank	Means any container designed to contain and store water intended for human consumption, and the definition includes any pipes connected to the tank.
Inspection	The process of evaluating the compliance of establishments and institutions with the health and safety requirements of water systems. The internal and external condition and storage conditions of drinking water to ensure that it is preserved in a proper manner and that it compatible to standard specifications.

Definition	Meaning
Buildings	all buildings and its facilities, with all their types and its uses covered by this guideline.
Cleaning Company	The licensed company or institution and approved to conduct any operations or activities related to cleaning, sterilization, and treatment of drinking water systems.
Responsible Person	The owner or any person under whose responsibility, directly or indirectly, supervises the management of an establishment or real estate, or in charge of the quality of water systems, or a maintenance team entrusted with conforming to the health and safety requirements issued by Dubai Municipality. And everyone who is responsible for installing consumers' water tanks or water equipment includes the registered owners or managers of buildings or agents.
Sample Collection	Water samples are collected periodically by accredited laboratories by the Emirates International Accreditation Center or by the regulatory authority, from water tanks or taps representing the water network, to test them in a laboratory according to the types of tests required.
Laboratory Test	Analyzing the water sample taken with the aim of determining its conformity with the relevant standard specifications or any specifications, criteria or limits set by the municipality.
Water Distributor	Represented by the Dubai Electricity and Water Authority as a service provider.
Supplier	It means any entity other than Dubai Electricity and Water Authority that is considered a source of water supply for various purposes and owns a distribution system, transport tanks, tanks or containers through which water is supplied for public use or human consumption.
Water network	Means any water network that delivered water, intended for use for human consumption inside buildings and includes pipes and their fittings, separators, valves, backflow prevention devices and includes water tanks, pumps, and any related equipment.

Water Quality	A measurable indicator of water, considering chemical, physical and biological indicators.
Pollution	It is the presence of a biological, chemical, physical, or radiological agent that causes disease or any other damage to public health or the environment.
Water Disinfection	The process in which disease-causing microorganisms and viruses are killed, their mechanism of action is disrupted, or even removed.
Ice	Ice intended for human consumption: Ice resulting from the complete freezing of potable water at a temperature not exceeding (-10) C. It comes in different shapes and sizes, including blocks, cubes, shells, etc..
Water Electrical Appliances	Household appliances that are used in the processes of cooling, heating, and freezing water
Bacteria Coliform	Gram-negative bacteria, grow aerobically (facultatively), ferment lactose sugar with the production of acid and gas within 48 hours at a temperature of 35-37°C.

5 Roles and Responsibilities

5-1 The role of Dubai Municipality

- Control and inspection of the establishments, institutions and buildings mentioned in the scope of application to ensure compliance with the conditions and requirements set by Dubai Municipality represented by the Health and Safety Department and to take legal measures against violators.
- Issuing applicable circulars and notifications, which ensure compliance with the standards and requirements contained in this guide.
- The Municipality has the right to authorize one of the competent authorities concerned at any time to represent it if permission is obtained.
- Periodic updating based on new data, information or other requirements would achieve a better level of awareness of the effects of chemicals or microbial organisms that affect water quality.
- The municipality has the right to collect samples from all water supply points to conduct appropriate test for it and verifying its safety throughout the supply chain and its compliance with the conditions

stipulated in Council of ministers Decision No. 26 of 2013 Concerning the UAE system for drinking water control.

5-2 The role of the owner of the building or owner's representative

- Commitment to applying the requirements and standards mentioned in this guide to ensure the quality and safety of water in the building until it reaches its users.
- Carrying out the necessary corrective actions, which may include cleaning and sterilization of water tanks, in addition to maintaining tanks and pipes, which affect the safety of water, if reports of laboratory test results are incomplete or not compatible or if there are violations in health conditions during the virtual inspection of water systems.
- Develop a plan for the safety of the water systems in the building, including the following:
  1) Diagrams describing the water systems in the building that are updated at intervals or based on significant changes in the water systems.
  2) Identification of Hazards in Water Systems Effective management of drinking water systems in buildings requires a comprehensive understanding of the system, including the scope of potential hazards and hazardous events that may arise during water delivery and use by building occupants and visitors as follows.
     a. Microbiological hazards (bacteria, viruses, and protozoa) that may be present in the building's water systems or that enter the water network as a result of misuse or from the internal or surrounding environment of the building.
     b. Chemical Hazards: Chemicals from external sources enter the water network. In addition, chemical hazards from processing processes, or from unsuitable materials, or released from corroding pipes (such as copper, lead, cadmium, and nickel) used in plumbing systems.
     c. Water aesthetic value and its properties, such as odors, tastes, or colors
  3) Appropriate safety plan for building users, whether they are residents or visitors, elderly or young, such as schools, hotels, nurseries, and other buildings.
  4) Allocate a team of employees in the building to be responsible for the safety of the water systems in the building. They are trained to control the hazards of water systems, whether physical, chemical, or microbiological.
  5) Determination Monitoring procedures, monitoring procedures should be in place for all identified risks to reduce the risk level to an acceptable level as determined by the concerned authority.

6) Corrective and preventive measures, any monitoring process that indicates that the operation is taking place outside the operational limits must be dealt with in two ways:
    1. First- any emergency action must be taken as specified by the building operator in the risk assessment and as specified in this guideline.
    2. Second- Corrective actions to prevent future incidents must be applied and documented.
7) Audit, test, and administrative control, the building operator shall define audit and monitoring activities and document the results of these activities. as the administrative review must be conducted on an annual basis and after each severe deficiency in the water system, through the following:
    a. Contracting with a laboratory accredited by the Emirates International Accreditation Center " EIAC " to collect and test water samples. Drinking water must be taken once every six months to carry out laboratory tests according to the parametric values specified in Unbottled drinking water standard UAE.S GSO 149:2021.
    b. Document records of water systems cleaning and inspections and reports of laboratory test results and submit them to the Health and Safety Department inspector on inspection visits upon request.

- The owner of the building or his representative must notify the concerned authorities if the results of the water test do not comply with the standards mentioned in this guide.

5-3 The role of companies responsible for cleaning and disinfecting water systems

Given the importance of the role of companies cleaning water tanks and disinfecting water systems in buildings, they must adhere to the following:

- Commitment to the standards and requirements stated in this guide in performing the tasks assigned to them by cleaning and disinfecting water tanks and networks to ensure the quality and safety of unbottled drinking water.
- The water tank cleaning company must be approved by Dubai Municipality – Food Safety Department, Registration and Permit Section
- Companies must adhere to the cleaning and disinfection methods and requirements approved by Dubai Municipality.
- The company must prepare and save cleaning and disinfection reports that include chemicals used, methods of use, mechanism of cleaning and disinfection, and what is related to it, and to be submitted upon request.

- The company must keep training records of cleaning workers and assess the efficiency of their employees according to work requirements.
- Companies must ensure the safety of workers to carry out activities related to cleaning, sterilizing, and inspecting water systems, including training certificates for working in confined spaces.
- Inform the owner of the building or the company responsible for the tank officially in the event of any problems related to the safety of the tank or Water, leakage, overflow, or weak flow and follow up on corrective actions for non-conformities.

5-4 The role of private laboratories

- Test water samples according to the specifications and standards issued by the GCC Standardization Organization (GSO) and the Emirates International Accreditation Center
- The laboratory must be accredited by the Emirates International Accreditation Center
- Communicate with the Health and Safety Department in the event of the presence of non-conforming samples in the buildings and facilities mentioned in the scope of application.

6 General Requirements

- Unbottled drinking water must meet all the conditions stipulated in the mandatory UAE Standard (Technical Regulation “Unbottled Drinking Water No.: (UAE.S GSO 149:2021)
- Adhered to UAE standards related to unbottled drinking water, water systems and networks, water tanks and water tankers related to it, water coolers and ice-making machines stipulated in Council of ministers Decision No. 26 of 2013 Concerning the UAE system for drinking water control.
- Adhered to the standards for drinking water regulations mentioned in the Dubai Building Code.
- Collecting water samples based on the recommendations and standards stipulated in ISO Water Quality — Sampling for microbiological analysis No. ISO 19458: 2006 (first edition).

- Compliance with the provisions of the Dubai Building Code, version 2021, part 5 dedicated to water supplies (H.5) ، which includes water tank requirements, and determining the size of the water tank to calculate the actual water demand for building occupants.

7 Water Quality Standards

7-1 Acceptance criteria

They are secondary parameters related to cosmetic effects (such as discoloration of teeth or skin) or aesthetic effects (such as taste, smell, or color) of drinking water, as well as the operational performance of water systems in accordance with the standards stipulated in UAE Standard (Technical Regulation "Unbottled Drinking Water No.: (UAE.S GSO 149:2021)

7-2 Health related standards

Health-related standards are based on the limits of acceptable impacts on human health ،and the aim is to reduce diseases resulting from the use of unbottled drinking water.

a. <u>The biological criteria:</u>
   - Unbottled drinking water must be completely free from algae, fungi, insects, their larvae, or its egg sacs or its parts, and from protozoa, including amoeba.

b. <u>Microbiological standards:</u>
   - Unbottled drinking water must be completely free from disease-causing microbes, coliform microbes and viruses that may cause harm to public health.
   - microbiological indicators should be tested according to regulatory requirements and Technical Regulation "Unbottled Drinking Water No.: (UAE.S GSO 149:2021) when analyzing routine water samples and in the cases mentioned in the monitoring and follow-up item.
   - The municipality can oblige the building owner regarding any additional microbiological, biological, or chemical evidence based on a risk assessment or in cases of complaints and emergencies.
   - Coliform bacillus (E. coli) is used as an indicator of the presence of pathogenic organisms resulting from the contamination of water resources with human excreta.

c. Chemical standards

- The routes and number of pollutants that enter a building, whether from outside or inside the building, can vary. Because scenarios for entry of pollutants into a building differ, the duration and level of pollutant concentrations in the water supply system will also vary, and the affected parts of the water system, including the building's plumbing system, will also be different. Thus, the response to a contamination event, including spreading control methods and contaminant removal procedures, will vary depending on where and how much of a contaminant was introduced. Most contamination events are detected based on factors such as: consumer complaint (odor, color, taste), illness or outcomes Water analysis or as a result of the periodic inspection of the water system in the building by the maintenance team, after that the first objective will be to determine if there is an actual contaminant present in the water supply, what it is, and how widespread it is. The point of entry of the pollutant can be deduced by collecting water samples from a group of sites and then drawing maps of the water lines that were found to be polluted. Therefore, the following must be adhered to:
    - Chemical indications must be checked according to regulatory requirements Technical Regulation "Unbottled Drinking Water No.: (UAE.S GSO 149:2021, when analyzing routine water samples and in the cases mentioned in the monitoring and follow-up item.
- The municipality can require the building owner about any additional chemical indications based on a risk assessment or in cases of complaints and emergencies.
- The levels of chemicals in drinking water should not exceed the limit values stated in standard of "Unbottled Drinking Water No.: (UAE.S GSO 149:2021)

8 Measures to Control Microbiological and Chemical Pollutants

Periodic disclosure must be specific and accurate of all risks assessed in the building, which are in accordance with the technical guides, local orders and specifications related to the quality of unbottled drinking water in the Emirate and updated based on any changes or updates in the water systems. The necessary measures for this include the following:

8-1 Preventive Measures (conditions for pipes, valves and connecting parts used for drinking water)

- That these preventive measures, whether in the construction, installation, or maintenance phase, be in conformity with the Dubai Building Code, below is a table that shows the part and section related to the requirements of the water system in buildings:

Section	Part number and Section
Wastewater reuse	H.5.2.7
Water tank location	H.5.5.2
Water tank construction	H.5.5.4
Combined firefighting and water storage	H.5.5.7
Servicing and isolation valves	H.5.7
Backflow protection	H.5.8
Water services system installation requirements	H.5.11
Provisions for future connections	H.5.12
Treatment against microbiological bacteria growth	H.5.6.1
Water softening	H.5.6.2
Controls and monitoring	H.5.9
Hot water services	H.5.10
Water storage tank sizing	H.5.5.3

- DEWA, as a water provider, calculates the capacity of tanks for each building based on specific bases, including the number of residents and the daily consumption rate.

- Storage capacity sufficient to supply water for at least 24 hours for the consumption of the population. The goal is to provide water that meets specifications and is acceptable to users, to reduce corrosion of pipes and tanks, rust and cross-contamination between materials and water, to reduce corrosion and release of chemicals, and to extend the life of pipes and related equipment.
- The right materials must be chosen (i.e., not only when constructing the building but also when installing, changing, and maintaining accessories to the water network).
- Reducing water stagnation.
- Prevent galvanic corrosion by avoiding contact between different metals.
- Prevent bacterial re-growth and formation of biofilms.

8-2 Water Treatment

Water treatment (such as removing corrosive ions and antirust chemicals, especially the hot water system, considering that the chemicals are approved and used according to the manufacturer

a. Unbottled water treatment requirements

- The water source must be approved by the relevant official authorities, after conducting survey and analytical studies to ensure that the water is suitable for use.
- The means of treatment, whether chemical ،physical ،or thermal, alone or in combination, should be sufficient to eliminate microbes.
- The residual free chlorine concentration in unbottled drinking water must be sufficient to kill all microbes in it ،provided that the residual free chlorine concentration in this water is 0.2-0.5 ppm.
- Chlorine concentration is increased in cases of epidemics or in special cases ،according to what is decided by the municipality or the competent authorities.

b. Water treatment to reduce microbiological pollutants.

The water is treated after entering the water from the source or the supplier, and the treatment units and devices are installed according to the type of water system in the building or according to the purpose of the treatment, and the treatment is in one of the following ways:

- **Temperature**: is recommended Store hot water at 60 °C and distribute it so that a temperature of at least 50 °C can be reached at points of use after one minute of operation. Cold water storage and distribution should be at or below 20 °C.

- **Ionization**: Ionization is the term given to the electrolytic generation of copper and silver ions for use as water treatment. The results of recent research have shown that where copper and silver ion concentrations can be maintained at 0.3 - 0.8 mg/l for copper and 0.03 - 0.08 for silver at the outlets, the technique can, if properly managed, be effective against planktonic Legionella in both hot and cold-water system.
- **Chlorination**: is the process of applying any of the chlorine containing compounds such as sodium hypochlorite (bleach solution) to the water to achieve necessary destruction of all bacteria; Chlorine is widely used as an important disinfectant and bleach. The World Health Organization Guidelines for Drinking-water Quality indicate/ establish the health–based limit values are 5.0 mg/l for total chlorine, however at high levels chlorine is likely to cause corrosion with prolonged use, The level used for treatment of domestic drinking water are usually maintained at between 0.2 and 0.5 ppm (mg/l) at the point of delivery when used continuously in domestic system.
- **Chlorine dioxide**: is an oxidizing biocide capable of reacting with a wide range of organic substances. There are commercial systems available that release chlorine dioxide from a stabilized precursor solution into the water system. The main concern with chlorine dioxide is with the residual concentrations of chlorine dioxide and the by-products chlorite and chlorate.

  The World Health Organization Guidelines for Drinking-water Quality (2017) indicate/ establish the health –based limit values are 0.7 ppm for both chlorite and chlorate. The WHO states that guidelines values for chlorite and chlorate are designated as provisional because use of aged hypochlorite or of chlorine dioxide as disinfectants may result in the chlorite and chlorate guidelines values being exceeded, and difficulties in meeting the guidelines values must never be a reason for compromising adequate disinfection.

  The guidelines health –based limit values for Chlorine dioxide did not establish by WHO (2017), however, it is normal practice to supply water with a chlorine dioxide residual of a few tenths of a milligram per liter to provide some protection against microbial regrowth during distribution. The maximum value of Chlorine dioxide in drinking water should not exceed 0.5 mg/l as Chlorine dioxide and this is often not enough to achieve control in colonized system. Chlorine dioxide levels of 0.1 to 0.5 mg/l can, if properly managed, be effective against planktonic Legionella in both hot and cold-water systems.

- **UV rays and ozone O3:** UV and ozone treatment systems are effective throughout the water system downstream to the point of use. And they are more effective at or near the point of use, considering that these systems are approved by the competent authorities.

c. Water treatment to control chemical pollutants.

Control measures can include common forms of treatment such as water softeners, deionizers, activated carbon and chemical treatment, and filtration, and the choice of equipment should depend on the source of the water entering the building. The selection of appropriate solutions also depends on companies specialized in water treatment approved by the competent authorities.

8-3 Operational Measures

The owners, principal manager, or person in charge of the building must comply with their statutory duties as follows: -

a. Regular maintenance procedures

1. The building shall have a Flushing policy and run all taps and showers in rooms and other areas for several minutes to draw through water at least once a week if rooms are unoccupied, and always prior to occupation.
2. The premises must maintain hot water heating and always circulating: 50 -60 °C throughout the entire hot water system / hot water storage must be maintained at a minimum temperature of 60°C
3. The premises must keep cold water cold at all times. Temperatures must be maintained below 20°C throughout the system for all outlets.
4. The premises must keep shower heads and water taps clean and free from sediments and scales.
5. The hot and cold-water system must be disinfected with enough chlorine to produce a free residual chlorine of 1-2 mg/L for 1 hour (each outlet is allowed to flow for at least 5 minutes) at least twice a year and if bacteria are detected in the system.
6. All water tanks should be emptied, cleaned, and disinfected with 50 mg/L of chlorine at least twice a year.
7. Water tanks must be protected from contaminants, and all tank covers must be ensured to be intact and fixed in place, and internally inspected at least monthly.

8. The water tank and its fittings must be checked and maintained periodically.
9. Water heaters (calorifiers) must be kept clean, and their water drained and disinfected at least twice a year.
10. Calorifiers flow temperatures (the thermostat setting should be set at 60°C as far as possible but not less than 60°C) ، and Calorifier return water temperature (not less than 50°C). For water heaters (not more than 15 liters) ، the water temperature should be kept close to 60°C.
11. Availability of a person responsible for water safety and quality in the building, and this person must be trained on water safety and quality.
12. Keeping the water system clean to reduce nutrients available for bacterial growth. Regular visual inspections should be carried out at least every week to avoid build-up of dirt, organic matter or other substances in the tanks and water flowing from points of use.
13. All cross connections (dead legs), water pipe ends, and stagnant water pipes in the water network must be removed or avoided from the point of entry to the building to the points of use.
14. Hygienic use of water connections and not using them for purposes that may result in microbial exchange or infection.
15. Hygienic practices in maintaining water supplies and water use devices and equipment.
16. Hygienic practices during repairs and avoiding cross contamination.
17. Provide appropriate training for maintenance personnel.
18. Reducing the following factors for microbial growth and composition of microorganisms in water systems:
    - stagnation and low water flow
    - Poor temperature control, which creates conditions that support microbial growth (eg, cold and hot water pipes are not insulated)
    - Calcification and corrosion, providing rough surfaces that promote biofilm growth.
    - suspended matters, which can provide nutrients that aid microbial growth.
    - Settled sludge that supports the growth of microorganisms.
    - Poor design, resulting in low flow or stagnant areas (long branch pipes and dead ends)
    - Poor maintenance and intermittent use of point-of-use equipment and appliances (such as ice machines and old carbon filters that are past their use-by date, which can support the growth of microbes (such as Listeria, Pseudomonas, Legionella, and fungi)

- Installing oversized storage tanks that cause stagnation and stratification (stratification can lead to lower water temperatures at the bottom of storage vessels)
- Failure to maintain water at sufficiently high temperatures in storage vessels (in some cases, temperatures in storage vessels may be reduced in an effort to save heating costs or to reduce the risk of hot water to the skin)
- Inadequate balance of permanent flow in ring systems or inadequate total flow rates to feed all parts of the piping system.
- Improper placement or operation of temperature-reducing procedures (such as thermostatic mixing valves) The main fault is locating these devices too far from taps and outlets, creating long tubes containing warm water.

9 Monitoring and Follow up

9-1 Verifying the effectiveness of the water safety plan.

For the effectiveness of the water safety plan, the risk assessment and the water safety plan in the building must be audited, whether internally by technicians and maintenance officials in the building, or externally by a company specialized in the field.

9-2 Water quality test

a. Frequency of drawing water samples and their numbers

The number of samples depends on the size of the building and the number of users in the building and the samples must be collected for reasons next:

- After a week of regular cleaning and disinfection (every six months)
- A week after the sterilization and disinfection process for emergencies or receiving reports or notifications of injuries from the use of water in the building.
- After the sterilization and disinfection process of the presence of pollutants in the reports of the Dubai Central Laboratory or the reports of private laboratories
- Periodic samples at least once every six months
- Any major changes, additions or maintenance to the water system and network in the building
- When adding a temporary or permanent water source to the building

b. Sampling locations

- From the taps after the correct procedures of sampling
- From the water tank, and it is from a faucet prepared for sampling at the outlet ،and if it is from the tank itself, it must be from under the surface of the water in the tank.
- From the water coolers in the building or fitted to it
- Ice making machines.

c. Microbial Parameters required for the test.

- Microbial parameters required for the test as per unbottled drinking water standard (UAE.S GSO 149:2021).

d. Chemical Parameters required for the test.

- Chemical parameters required for the test as per unbottled drinking water standard (UAE.S GSO 149:2021).

e. Water sampling

Any building owner or any entity must ensure, as far as possible, that the appropriate requirements are met when collecting, processing, transporting, or sorting any required samples, the following should be met in the samples:

- The sample should reflect the water system in the building.
- Protecting the sample from external contaminants from the moment it is collected until it is delivered to the analysis laboratory.
- Storing the sample in appropriate conditions so that no tangible change occurs to its required standards.
- Analyze the sample as soon as possible after collecting the sample.
- The sampling procedures contained in ISO Water Quality - Sampling for Microbiological Analysis No. ISO 19458: 2006 (First Edition) must be followed.

9-3 Monitoring and Sampling Programs

- The municipality is responsible for conducting monitoring programs for drinking water quality to ensure the quality of drinking water.

- municipality has the right to control and inspect buildings to ensure compliance with the standards specified in unbottled drinking water standard (UAE.S GSO 149:2021).
- In the event of non-compliance with the drinking water standards mentioned in the guide, or receiving any complaints from consumers, the municipality has the right to conduct the necessary investigations, including taking water samples to achieve and provide safe water for use.

9-4 Operational monitoring

Operational monitoring means the procedures for monitoring water quality during and after the treatment process and after its transfer in the water distribution network and in the building or institution. It is considered part of the water safety plan as shown in the following points:

- Frequency of monitoring shall be in accordance with the establishment's water safety plan.
- Monitoring operations must be carried out in the water network in the building or institution when major changes occur in the network, such as the installation of new tanks or heaters.... etc.
- All monitoring data must be kept for a minimum of 2 years, although the municipality can set a longer period under certain circumstances.
- The frequency of monitoring depends on the risk assessment of the water source, treatment, and supply systems.
- Monitor water quality parameters such as disinfectant residues (residual chlorine) ، pH, temperature, flow rate at points of use daily.

9-5 records

a. <u>Building records</u>

- Formal risk assessment and control system to ensure safe operation, maintenance, and monitoring program in place and to ensure continuous safety of the water system.
- Sampling point locations plan according to the risk assessment survey of all water systems in the building that cause a risk to human health.
- All water system diagrams, operation and maintenance procedures manuals.
- Water tank cleaning reports
- Periodic water system disinfection reports
- Contracts for cleaning and disinfection of water tanks and systems in the building

- Inspections and maintenance and the results of each inspection.
- Details of treatment procedures, type, and method of use of biocides, Material Safety Data Sheet (MSDS) of Chemicals.
- Names of personnel responsible for operating and shutting down the system
- The result of any system's test and microbiological test of water samples.
- Keeping records of reports submitted by inspection, cleaning and sterilization companies and samples of water tanks for a period of five years in the absence of an electronic system.

b. Companies and laboratory records

- The cleaning company documents and submits all inspection and cleaning reports to the control authority upon request.
- The laboratory is committed to submitting all the results of drinking water samples taken after the cleaning process to the regulatory authority (upon request) and to the owner of the building or institution.
- The inspection company or evaluation company ،if contracted with it, shall document, and report any non-compliance resulting from the inspection or analysis of water samples or consumers' water tanks to the regulatory authority upon request ،and to the owner of the establishment or facility.
- The responsible company must document and submit reports on all environmental, health and safety risk assessments and accidents to the responsible person in the facility or institution and the regulatory authority upon request.
- Companies keep training documents and evaluate the efficiency of their employees.

10 Requirements for Supplies and Tools Used with Drinking Water

10-1 Filter requirements

Because filters ،water coolers, and ice-making machines are important to water quality and safety, and their impact on water standards ،whether biological, microbiological, or chemical, which may affect human health, the requirements for filters, water coolers, and ice-making machines that may affect human health, which ensure water safety for consumers are indicated below.

- Drinking water filters must meet the conditions stipulated in the approved UAE Standard No. UAE S GSO 2071 Jug Water Filter for Household Uses, and it must have a certificate of conformity, the Emirates quality mark, or any certificate of conformity or mark recognized by the competent authority.
- Approval by the specialized authorities
- Provide product quality assurance documents such as units tested or flow rate and post-treatment test samples.
- Provide adequate training for technicians or users on how to operate and maintain properly.
- Availability of spare parts and maintenance so as not to continue to use water without treatment.
- Residual concentrations of disinfectant must be sufficient to prevent re-contamination but not exceed concentrations that would be harmful to health or rejected by consumers.
- The performance of microbial disposal should be in accordance with the standards of the World Health Organization (Results of Round II of the WHO International Scheme to Evaluate Household Water Treatment Technologies (WHO 2019)).
- Should have an effective effect on reducing pollutants.
- The material the filters are made of should not affect the water quality (such as a ceramic filter that may cause arsenic in the water)
- Product information provides product and manufacturer details: product (commercial) name; batch number / date of manufacture; Manufacturer name and contact channels.
- Regular maintenance and cleaning as recommended by the filter manufacturer.
- Product selection should be made by understanding the assessment of risks in the building including source water quality, contamination risks, building turbidity and chemicals affecting health.

10-2 Requirements for drinking water coolers and fountains

- Drinking water coolers must meet the conditions stipulated in the approved UAE Standard Specification No. (UAE.S GSO 1811) ، And that she has obtained a certificate A conformity, the Emirates quality mark, or any certificate of conformity or mark recognized by the competent authority.
- Its design should be in accordance with what was stated in the Dubai Building Code, Issue 2021, Item No. C.8.7.
- Places where drinking water fountains must be provided as mentioned in Dubai Building Code 2021 Item B.8.2.1
- They should be placed in safe and clean areas so as not to impede movement in the building.
- They are not installed inside public water toilets.
- Clean the cooler periodically according to the manufacturer or according to the result of testing the cooler.
- It is preferable to contract with the manufacturer to clean the coolers.
- The use of materials approved by the municipality to clean the coolers.
- Cleaning the cooler taps and removing scale with materials approved by the municipality.
- Close the cooler tanks to protect them from pollutants, insects, and animals.
- Changing water filters according to the manufacturer, with labels showing this
- The filters must be from a company approved by the competent authorities.
- Consumption volume must be considered when changing filters.
- Drying the floors around the coolers to prevent the breeding of insects and the gathering of algae around the radiator.
- The cooler shall be made of stainless materials and materials approved to prevent chemical contamination of the water.
- Prevent water leakage from any part of the cooler.
- Schedule daily, weekly, monthly, and annual maintenance and inspection
- a water sample for microbiological and chemical testing according to what is mentioned in this guide or whenever required.
- Putting the cooler at a suitable temperature to prevent water warming, which helps in the non-growth of bacteria ،and away from direct sunlight.
- Considering seasonal levels of use, such as holidays in schools

- Draining the water and re-cleaning and disinfecting the cooler after each long downtime (a week)
- Shut down the cooler from service in the event of any signs of contamination or a change in taste, smell.
- cooler cleaning and disinfection once every six months along with the building's water systems
- Place an anti-flow valve at the point where the cooler connects with the water source.
- Plumbing connections and the water tank must be easy to clean, prevent water stagnation in part, and be free of dead legs.
- If there are any samples that do not conform to the water cooler, they must be removed from service and cleaning and disinfection procedures must be taken.
- Putting contact numbers near the cooler to communicate in case of any problems with the cooler.
- The discharge of the cooler water should be far from the drinking water supply and be in the place designated for it.
- The cooler should be in a place high off the ground and on a floor that does not allow water to collect to prevent rust and to facilitate the process of draining water.
- Draining a tray that collects water under the faucets periodically, preventing water from pooling in it or draining it to the ground.

10-3 Requirements for ice machines in built environments

Ice machines and the resulting Ice may be contaminated by workers, improper storage, or poor maintenance or cleaning .Which results in diseases of the digestive system or infections in the respiratory system, such as Legionnaires' disease, so the following must be considered:

- Freezers for drinking water must meet the conditions stipulated in the UAE Mandatory Standard (Technical Regulation) Special requirements for Household and Similar Electrical Appliances - Safety - Part 2- Section 24: for Refrigerating, Ice-Cream Appliances, and Ice Makers No. (UAE. S GSO IEC 60335-2-24) and have a certificate of conformity or Emirates Quality Mark.
- The water used in its manufacture must conform to GSO 149/2021 Unbottled Drinking Water
- All containers and covers used in manufacturing be clean and that they are washed and disinfected with solutions and detergents approved by the municipality.
- Ice machines are checked monthly, drained, cleaned, and refilled according to manufacturer's instructions.

- Machine sterilization should be performed every six months according to the manufacturer's instructions either with a chemical disinfectant or by heat washing and cleaning of the water lines using a mild chlorine solution or water heated to a minimum of 65 degrees.
- Ice must be handled with tools that prevent contamination and the transmission of infections and pollutants of various kinds, whether physical, chemical, or microbiological.
- Periodically clean the ice bin after emptying it with tools and detergents approved by the municipality.
- All removable components must be disassembled and cleaned on a quarterly basis and must include the water lines, air filter, water filter, vents, and condenser.
- Signs must be placed showing that ice is for human use.
- Ice machines should be dried, cleaned, and kept dry when not in use.
- Ice machines must always be disconnected from the water supply before carrying out cleaning and disinfection of the water system. If not separated, ice machines must be cleaned and rinsed prior to use.
- Ice for human consumption is microbiologically tested every 6 months.

10-4 Requirements of tankers for transporting and distributing unbottled drinking water:

- Tanker trucks intended for transporting unbottled drinking water must meet the conditions stipulated in the approved UAE standard " Vehicles – Requirements in Tankers for Transportation of Drinking Water " No. (UAE.S GSO 2025-2010)
- Vehicles for transporting and distributing unbottled drinking water must be licensed by the competent authority.
- The driver obtains the necessary qualifications and competencies to carry out his work in accordance with the applicable regulations in this regard.
- Obtaining the necessary permits from the competent authorities to provide the service.
- Compliance with the conditions and procedures stipulated in the terms of the permit.
- Compliance with all health, safety, and environment requirements
- Providing all filling stations and supply points with highly qualified and efficient workers
- Tank filling stations keep tanker records such as tank permit numbers, tank capacity, tank plate numbers, data of drivers, date of entry of tanks, number of times they frequent filling stations, drainage points, water source and destination.
- Do not use drinking water tankers for any other purpose to prevent cross contamination.

- Do not fill tankers from sources other than approved filling stations.
- Placing drinking water signs clearly on the tanker, in both Arabic and English, and symbols explaining this
- Ensuring the quality of drinking water that is transported by tankers and at filling points, whether through operational, maintenance or control procedures such as water testing
- The competent authority maintains all water quality records.
- The quality of tanked water that is packaged at each tanker filling station.
- Maintain reports of non-conformities and actions taken to correct the non-conformance.
- Drinking water transportation service providers keep permits and other certificates in the vehicle.
- Facilitate the work of observers and do not hinder them from performing their work.
- The construction/manufacture/installation/connection or maintenance of tankers must comply with the requirements and regulations in force in the Emirate of Dubai
- Ensure that no water contamination occurs during filling, transportation and unloading.
- Dubai Municipality must be notified of any case of water pollution or non-conformity of water samples with the indications stipulated in this guideline.
- Consumers undertake the following tasks in particular:
  - ✓ Provide suitable water connections that comply with the requirements of the water supply instructions.
  - ✓ Disclosure of any risks that may be within their facilities/establishments.
  - ✓ Use of drinking water for the customer's private purposes only

11 Corrective Actions and Response to Incidents and Non conformance of Water Samples

Many potential incidents can be predicted, such as microbiological or chemical contamination or the formation of biofilms in the water network. Whether the pollution is caused by an external or internal source from the water network and its accessories, the following measures must be taken:

- Notify the municipality and the concerned department through the communication channels mentioned in this guide.
- Prevent consumption of contaminated water until appropriate water treatment procedures are considered.
- Notify residents and water consumers of the procedures that will be applied in the building.
- Provide alternative safe water to users until the water is treated.
- The necessity of disinfecting the entire water system, and this process must be monitored by measuring the concentrations of disinfectants momentarily and in the field at points of use throughout the building, and the effect of disinfection must be verified by microbiological analysis, and users must be alerted to the presence of disinfectants that may cause eye or skin irritation or unpleasant odors.
- Drainage of water from the building
- Cleaning the entire water system, including water tanks and water network accessories
- Elimination of the source of chemical contamination. This can be verified by chemical analysis.
- A plan to treat or change the source of chemical pollution, especially the old pipes, or those that cause an increase in some substances that affect health in the event of its increase, such as lead pipes.
- Heat disinfection at temperatures over 60°C (preferably over 70°C) and consumers should be notified when heat disinfection is applied so as not to cause burns from hot water.

12 Violations and Fines

If one of the parties does not comply with the guide and fulfill its requirements, the party is alerted to the need to rectify and correct their situation within the specified time limit. This entity that does not take the required corrective measures will be fined and appropriate legal measures will be taken against it by Dubai Municipality.

- **List of violations and fines**

No.	Violation Description	Penalty (In AED)
1	Violation of health conditions related to the safety of drinking water or ice	500
2	Violation of health conditions related to the safety of drinking water or ice sources	1000
3	Violating health conditions related to cleaning drinking water tanks	1000
4	Violation of health conditions related to the safety of water containers and bottles	500
5	Violation of health conditions related to transporting drinking water or ice	1000
6	Violation of health conditions by establishments and companies working in the field of cleaning drinking water tanks	1000
7	The presence of a person who works in the health establishment or is related to public health or food and has a communicable disease	1000
8	Non-compliance with the undertaking to fulfill the health requirements by the establishments concerned with public health, or to practice any activity stipulated in the local order or its implementing regulations without a permit approved by the competent department	20000

1. References

- Council of ministers Decision No. 26 of 2013 Concerning the UAE system for drinking water control.
- Local Order No. (11) of 2003 Concerning Public Health and Safety of the Society in the Emirate of Dubai.
- Administrative Order No. (30) of 2007 Issuing Local Order No. (11) of 2003 Concerning Public Health and Safety of the Society in the Emirate of Dubai
- Standard of unbottled drinking water UAE.S GSO 149:2021.
- Standard of Ice for Human Consumption UAE.S GSO 384:1994
- Technical Guide for Legionella Control in Water Systems DM-HSD-GU44-LCWS2
- Dubai Building Code, version 2021
- Microbiological Criteria for foodstuffs GSO 1016:2017
- Regulations for Water and Wastewater Tanker Services (Abu Dhabi Department of Energy) Issue Date: June 14 (2020)
- Standards of drinking water quality (General Presidency of Meteorology and Environment) - Kingdom of Saudi Arabia)
- Drinking-water Quality Fourth edition incorporating the first and second addenda (WHO 2022)
- Water safety in buildings (WHO March 2011)
- Removing Biological and Chemical Contamination from a Building's Plumbing System: Method Development and Testing (EPA)
- Results of Round II of the WHO International Scheme to Evaluate Household Water Treatment Technologies (WHO 2019)
- Household Water Treatment Filters Product Guide (UNICEF First edition, April 2020)
- Provision of drinking water fountains in public areas a local government action guide (Victorian Health Promotion Foundation Australia NOV 2016)
- Ice Machines Cleaning and Maintenance Procedure (Western Australia Country Health Service 07 DEC 2020)

For (suggestions, comments, and complaints)	For further information
▪ Unified interactive platform that connects Dubai Government and its customers: The 04 Platform https://04.gov.ae/ ▪ ✆ Dubai Municipality - Call Center (24/7): 800900	▪ ✉ ehcinspection@dm.gov.ae ▪ ✆ Dubai Municipality - Call Center (24/7): 800900