



National Standard of the People's Republic of China

GB 19304-2018

National food safety standard
Hygienic specifications for the production of packing
drinking water

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Foreword

This standard replaces GB 19304-2003 “Hygienic specifications of factory for packing drinking water” and GB 16330-1996 “Hygienic specifications of factory for drinking natural mineral water”.

Compared with GB 19304-2003 and GB 16330-1996, the major changes of this standard are as follows:

- the Chinese name of this standard has been revised to “National food safety standard Hygienic specifications for the production of packing drinking water”;
- the structure of this standard has been adjusted according to GB 14881;
- the scope has been revised;
- the terms and definitions have been revised;
- the requirements for water quality monitoring of source water for production have been revised;
- the requirements for hygienic protection of the water source have been revised;
- the hygiene requirements for collecting source water have been added;
- the requirements for plant and workshop, facilities and equipment have been revised;
- the food safety control requirements for production process have been added;
- Annex A “Guidelines for monitoring procedures of microorganism for the process of packing drinking water” has been added.

National food safety standard

Hygienic specifications for the production of packing drinking water

1 Scope

This standard specifies the basic requirements and management guidelines for water quality monitoring of source water for production, hygienic protection for water source and collection of source water for packing drinking water, as well as sites, facilities, equipment and personnel for processing, packaging, storage and transportation in the production process.

This standard applies to drinking natural mineral water, drinking purified water and other drinking water.

2 Terms and Definitions

2.1 Source water for production

It refers to the raw material water used to produce packing drinking water, which may be source water from a non-public water supply system (surface water or groundwater) or water from a public water supply system.

3 Water Quality Monitoring for Source Water for Production

3.1 When water from public water supply systems and non-public water supply systems is used as the source water for production (excluding drinking natural mineral water), the monitoring items of water quality for source water shall be monitored according to the requirements of the raw material specified in GB 19298.

3.2 The water quality of source water for drinking natural mineral water shall be monitored according to the requirements of the raw material specified in GB 8537.

3.3 When the water from non-public water supply system is used as source water for production, the frequency of monitoring shall be at least once every year during the wet season and dry season; in case of special circumstances (such as earthquakes or floods), the monitoring frequency shall be increased.

3.4 Where the water from non-public water supply system is used as source water for production, the sampling point shall be the outlet of the source water; while the water from the public water supply system is used as the source water for production, the sampling point shall be set at the inlet of the public water supply.

3.5 When the water from public water supply systems is used as the production of source water for packing drinking water, the monitoring reports of water quality of public water suppliers can be used as its monitoring basis, and it shall be ensured that the water quality complies with the requirements specified in GB 5749. In case of special circumstances (such as earthquakes or floods), the monitoring shall be strengthened.

3.6 When the monitoring result fails to meet the relevant standards, corresponding corrective measures shall be taken immediately.

4 Hygienic Protection for Water Source

4.1 Hygienic protection for water source with groundwater used as the source water for production

When the groundwater is used as the source water for production, only limited treatment methods such as degassing, aeration, decantation, filtration, ozonation, or ultraviolet disinfection and sterilization processes are allowed to be used, and it shall not change the basic physical and chemical characteristics of water, and its hygienic protection areas shall be established for the water source area, and the protection areas shall be divided into Grade I, Grade II and Grade III, and fixed signs and hygienic protection area maps shall be set in the protection area.

4.1.1 Grade I protection area (collection area)

The scope shall include intake points of groundwater, and building areas for diversions and water intake. The distance between the boundaries of the Grade I protected area and water intake point shall be at least 15 m. There are enclosed buildings at the water intake point, and there are special people to manage it; the entry of personnel without authorization shall be restricted within the scope; buildings that have nothing to do with water diversion shall be prohibited from setting; all factors that may cause groundwater pollution and activities that impede the normal operation of groundwater collection shall be eliminated.

4.1.2 Grade II protection area (inner protection area)

The scope shall include the area surrounding the water source, that is, the runoff area where groundwater flows to the water intake point. Within a radius of 30 m from the perimeter of the spring (well), residential areas, toilets, puddles, garbage, waste residue, or sewer lines must not be installed. Within this range, it shall be forbidden to set up water diversion projects that can lead to changes in groundwater quality, water volume, and water temperature; and it shall be forbidden to carry out human life and economic engineering activities that may cause aquifer pollution.

4.1.3 Grade III protection area (external protection area)

The scope shall include the entire area of the replenishment and formation for the groundwater resources, the protection radius of which shall not be less than 100 m, and only economic engineering activities that are not harmful to the hygienic conditions of water sources shall be permitted in this area.

4.2 Hygienic protection for water source with the surface water as source water for production

Protection measures shall be taken within the easy pollution scope, and it shall not cause any physical, chemical and microbiological pollution of the water source.

5 Hygienic Requirements of Source Water Collection for Production

5.1 When water collected from the public water supply system is used as source water for production, measures shall be taken to avoid reverse pollution to the public water supply system, and the water treatment system shall not be directly connected to the pipe network of the public water supply system.

5.2 When water collected from non-public water supply systems (surface water or groundwater) is used as source water for production, it shall meet the following requirements.

5.2.1 Collection points

Effective hygienic protection measures shall be taken to prevent water other than source water from entering the collection equipment. Sampling points shall be set up, the design and operation of which shall avoid pollution of source water.

5.2.2 Collection areas

A protective isolation area shall be set up around the collection areas to limit the entry of livestock and unauthorized personnel. Water outlets or water intakes shall be provided with appropriate protective facilities. Groundwater outlets (such as wellheads and springs) shall be protected by constructions.

5.2.3 Collection equipment

Effective hygienic protection measures shall be adopted for the installation and maintenance of equipment to avoid pollution of source water. Disinfection shall be conducted in time when new collection points (such as wells) are built near the water collection point, or water pump repairs are shifted, or other collection and maintenance actions are taken. The water collection capacity of the collection equipment shall match the allowable production volume.

5.2.4 Collection and transportation

Closed pipes shall be used for transportation to prevent pollution, and containers shall not be used for transportation to different places.

6 Site Selection and Plant Environment

In addition to complying with the provisions of Chapter 3 of GB 14881-2013, when the surface water or groundwater is used as source water for production, the plant shall be selected in the vicinity of the water

source that can supply the source water through the pipes.

7 Factory Buildings and Workshops

In addition to complying with the provisions of Chapter 4 of GB 14881-2013, the following requirements shall also be met.

7.1 Factory buildings and workshops shall have water treatment area, filling protection area, testing laboratories, packaging area, raw & auxiliary material and packaging material warehouses, and finished product warehouse set.

7.2 Turnover container shall be applied for the production of packing drinking water, and the checking and pretreatment area for the turnover container shall be separately established.

7.3 If the food additives are used in the production process (except gas), the distribution area shall be set.

7.4 The factory buildings and workshop shall be divided into general working areas, quasi-cleaning working areas and cleaning working areas. The general working areas usually includes water treatment area, packaging area, warehouse, checking area for the turnover container, *etc.*; the quasi-cleaning working areas usually includes distribution area, cleaning and disinfection area for pre-packaging, *etc.*; the filling protection area shall be set in the cleaning working areas. Equipment, with blowing-filling-capping (sealing) with self-contained clean room and automatic recovery function for clean environment and forming a clean working environment inside, can be set out of the cleaning working area.

7.5 Effective separation shall be adopted among general working areas, quasi-cleaning working areas and cleaning working areas to prevent cross-contamination.

8 Facilities and Equipment

In addition to complying with the provisions of Chapter 5 of GB 14881-2013, the following requirements shall also be met.

8.1 Facilities

8.1.1 Water facilities

8.1.1.1 Water for different purposes (such as source water for production, water for cleaning and disinfecting water, auxiliary water for production, *etc.*) shall avoid cross-contamination. Each pipeline system shall be clearly marked to distinguish, and enterprises are encouraged to set up recycling facilities for cleaning water.

8.1.1.2 Auxiliary water for production includes water for boiler room, machine repair, refrigeration, air compressor and vacuum pumping station, sewage station, testing laboratory and storage & transportation.

8.1.2 Cleaning and disinfection facilities

Corresponding cleaning and disinfection facilities for containers shall be provided according to the process requirements. Cleaning and disinfection for facilities and pipes in contact with the product shall be equipped with cleaning and disinfection facilities, and the application of clean in place (CIP) shall be encouraged; the effectiveness of cleaning and disinfection shall be evaluated periodically.

8.1.3 Personal hygiene facilities

8.1.3.1 The distribution area shall be provided with secondary shoes changing (wearing shoe cover) facilities or disinfection facilities for working shoes and boots, and hand washing, drying and disinfection facility.

8.1.3.2 The entrance of the cleaning working area shall be provided with a secondary dressing room, air shower facilities, shoes change (wearing shoe covers) facilities or disinfection facilities for working shoes and boots, and hand washing, drying, and disinfection facilities.

8.1.3.3 Blowing-filling-capping (sealing) equipment shall not be located in the cleaning working area according to the requirements of 7.4, and the entrance of the filling protection area may not be equipped with a secondary dressing room, air shower facilities, disinfection facilities for shoes and boots and hand washing, drying and disinfection facilities.

8.1.3.4 Air shower facilities shall be cleaned and maintained regularly.

8.1.4 Air purification facilities

8.1.4.1 Water storage tanks for food processing shall be equipped with air breathing apparatus.

8.1.4.2 The filling protection area shall be equipped with an air filter device to filter and purify the air, and the filter device shall be cleaned regularly.

8.1.4.3 The static air cleanliness (suspended particles and sedimentation bacteria) of the filling protection area shall reach 10000 level and the filling part shall reach 100 level; or the static overall air cleanliness of the filling protection area shall reach 1000 level.

8.1.4.4 Compressed air directly in contact with the product or packaging during the production process shall be subjected to degreasing, dewatering and dust removing and filtration.

8.1.5 Storage facilities

It shall have storage facilities that are compatible with the quantity of products produced, storage requirements, turnover period of the turnover container and product inspection cycle.

8.2 Equipment

8.2.1 Collection equipment, water pipelines and water storage equipment shall be cleaned and disinfected regularly. The water storage equipment shall be sealed, easy to drain and clean, and avoid forming a stagnant water layer.

8.2.2 Water treatment equipment shall include fine filtration equipment, disinfection/sterilization equipment (such as ozonator and mixing equipment, ultraviolet disinfection equipment, sterilization and filtration equipment, *etc.*). Water treatment equipment for the production of purified drinking water shall also include anti-penetration equipment or distillation equipment or other deionization equipment.

8.2.3 If filter sterilization equipment is used, the aperture of the membrane shall be at least 0.45 μm .

8.2.4 If food additives need to be added, automated control equipment shall be adopted for the addition.

8.2.5 Fully automatic control equipment shall be adopted for filling and capping (sealing) equipment, which shall not be manually filled or manually capped (sealed).

8.2.6 If the turnover container is used for the production of packing drinking water, external washing equipment, automatic internal washing and disinfecting equipment, inspection equipment of lights, automatic filling and capping (sealing) equipment, cover cleaning or disinfection equipment, and coding equipment, *etc.* of turnover container shall be equipped, for example, in the production of bottled drinking water, a capping equipment and a bucket thermoplastic film wrapping and sealing equipment shall also be equipped.

8.2.7 Internal cleaning and disinfection equipment of empty bucket for turnover shall be continuous automatic equipment, including at least 10 cleaning and disinfecting stations including pre-cleaning, cleaning with detergent, cleaning with disinfectant, washing with water, and water washing of finished product (including draining process), and washing time, pressure, the concentration of detergent and disinfectant shall be set reasonably to ensure the cleaning and disinfection effect of the empty bucket.

9 Hygienic Management

It shall comply with the provisions of Chapter 6 of GB 14881-2013. If ozone sterilization process is used, the ozone concentration in the air of the workplace shall comply with relevant regulations.

10 Food-related Products

In addition to complying with the provisions of Chapter 7 of GB 14881-2013, the following requirements shall also be met.

10.1 Non-wired production (outsourced) packaging containers (bottles, buckets, bags), caps of bottle and lids of bucket shall be packaged with clean and hygienic and waterproof materials during transportation and storage. The transport compartments and storage warehouse shall be kept clean. It shall not be mixed with toxic and hazardous materials during transportation and storage, and dustproof and anti-contamination

measures shall be conducted.

10.2 Packaging containers and materials shall comply with relevant standards or regulations and shall not affect the food safety and product characteristics under specific storage and use conditions. Additives used for packaging containers and materials in contact with food shall comply with the requirements of GB 9685 and related regulations.

10.3 The turnover bucket shall be made of materials that meet the requirements of 10.2, such as polycarbonate (PC), *etc.*

10.4 Empty bucket that are transferred back to the factory shall be strictly checked for the tightness and safety of the buckets. If the quality and safety of the products are affected, they shall not be used any more. The turnover container shall not be stored in the open air.

11 Food Safety Control during the Production Process

In addition to complying with the provisions of Chapter 8 of GB 14881-2013, it shall also meet the following requirements.

11.1 Control of water treatment process

The water treatment process shall be set up in accordance with the type of the source water, characteristics of water quality and water quality requirements of the product.

11.1.1 Control of chemical pollution

11.1.1.1 In order to reduce or remove certain chemicals, the source water may be treated accordingly, including physical (mechanical) filtration and chemical treatment, which is completed by the process such as membrane filter, sand filter or compressed fiber filter, activated carbon filtration, deionization (reverse osmosis, *etc.*) and aeration.

11.1.1.2 If the aeration process is used for removing iron and manganese, effective measures shall be taken to prevent pollution.

11.1.2 Microbial pollution control

11.1.2.1 In order to control microbial pollution, the source water can be treated accordingly, including chemical treatment (such as ozone disinfection) and physical treatment (such as ultraviolet disinfection, filtration sterilization, *etc.*).

11.1.2.2 When the ozone disinfection process is adopted, the ozone concentration shall be strictly controlled to avoid or reduce the bromate salt on the premise of ensuring the sterilization effect.

11.1.2.3 When the ultraviolet disinfection process is adopted, ultraviolet intensity shall be monitored regularly. When the ultraviolet intensity is reduced to less than that of the specified requirements, it shall be replaced in time to keep the surface of the ultraviolet lamp clean.

11.1.2.4 When the filter sterilization process is adopted, the filter membrane or filter material shall be replaced regularly, and it shall be backwashed and cleaned regularly, and the performance of the membrane shall be checked, *etc.*

11.2 Maintenance of the equipment during the production process

The effectiveness of the water treatment shall be monitored and maintained: establish maintenance plans, set up monitoring indicators, and maintain implementation records.

11.3 Monitoring of microorganisms during production

Monitoring of microorganisms shall be carried out in key production processes such as filling protection area and packaging containers after cleaning and disinfection. Detailed monitoring requirements can be implemented in accordance with Annex A.

12 Product Inspections

In addition to complying with the provisions of Chapter 9 of GB 14881-2013, it shall also meet the following requirements.

12.1 Production line inspection

12.1.1 After filling and capping (sealing), the appearance, filling volume, container condition, tightness of capping (sealing) and visible objects by naked eyes of the product shall be inspected.

12.1.2 The production enterprises shall be equipped with inspection personnel for empty bottles, empty buckets and finished products that are consistent with the production capacity.

12.1.3 It is recommended that enterprises use online inspection equipment, such as inspection equipment for empty bottles or finished bottles.

12.2 Laboratory inspection requirements

It shall be provided with the inspection capability for corresponding indicator, including the aerobic bacterial count, coliforms, turbidity, chromaticity, ozone concentration (only for the use of ozone process), conductivity (only for purified drinking water); those who use non-public water supply systems as water sources shall also have the inspection capability of *Pseudomonas aeruginosa*, which can be entrusted to a qualified third party for inspection.

13 Storage and Transportation

It shall comply with the provisions of Chapter 10 of GB 14881-2013.

14 Product Recall Management

It shall comply with the provisions of Chapter 11 of GB 14881-2013.

15 Training

It shall comply with the provisions of Chapter 12 of GB 14881-2013.

16 Management System and Personnel

It shall comply with the provisions of Chapter 13 of GB 14881-2013.

17 Records and Document Management

It shall comply with the provisions of Chapter 14 of GB 14881-2013.

Annex A

Guidelines for monitoring procedures of microorganism for the process of packing drinking water

A.1 Monitoring of microorganism in the process of packing drinking water can be carried out in accordance with Table A.1.

A.2 The sampling and treatment and inspection methods of the sample shall be determined according to the actual production conditions.

A.3 The limits of monitoring indicators are determined according to the characteristics of the product and the actual production conditions. The monitoring results of each monitoring point shall meet the limits of the monitoring indicators and remain stable. When there is a slight non-conformity, the monitoring can be strengthened by increasing the sampling frequency; when a serious non-conformity occurs, it shall be corrected immediately and the cause of the problem shall be found at the same time to determine that the corrective action is required for the control program of microorganism.

Table A.1 Requirements of monitoring procedures of microorganism for the process of packing drinking water

Monitoring items	Recommended sampling points and samples ^a	Recommended monitored microorganism ^b	Recommended monitored frequency ^c
Monitoring of microorganism in the environment	Hands of personnel in filling protection area	Coliforms	Every week, every two weeks, or every month
	Filling protection area	Settle microbe (at-rest) ^d	Every week, every two weeks, or every month
	Filling head of the filling equipment	Coliforms and aerobic bacterial count	Every week, every two weeks, or every month
Monitoring of microorganism of process products	Packaging materials after cleaning and disinfection (bottle, bucket and cap) [except blowing-filling-capping (sealing) integrated equipment].	Coliforms and aerobic bacterial count	Every week, every two weeks, or every month
	Water after treatment and before filling	Coliforms, aerobic bacterial count and <i>Pseudomonas aeruginosa</i> ^e	Every week, every two weeks, or every month

^a Sampling points can be selected according to the characteristics of food and the actual conditions of processing.
^b One or more indicator bacteria can be monitored based on need.
^c The monitoring frequency can be determined according to the risk of specific sampling points.
^d The settle microbe is determined by natural settle method in GB/T 18204.3.
^e The test of *Pseudomonas aeruginosa* is only applicable to packing drinking water with non-public water supply system used as its source water for the production.