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Packaged drinking water — Specification

EAST AFRICAN COMMUNITY

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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

In order to achieve this objective, the Community established an East African Standards Committee mandated to develop and issue East African Standards.

The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

DEAS 153 was prepared by Technical Committee EASC/TC 081, *Drinking water*.

This third edition cancels and replaces the second edition (EAS 153:2014), which has been technically revised.

Packaged drinking water — Specification

1 Scope and field of application

1.1 This Draft East African Standard specifies requirements and methods of sampling and test for packaged drinking water for direct human consumption.

1.2 This standard applies to drinking water, carbonated drinking /sparkling drinking water and alkaline drinking water.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ASTM D 5907-13, *Standard test methods for filterable matter (total dissolved solids) and non-filterable matter (total suspended solids) in water*

EAS 13, *Containerized mineral water*

EAS 38, *Labelling of prepackaged foods — Specification*

EAS 39, *Hygiene in the food and drink manufacturing industry — Code of practice*

ISO 10523, *Water quality — Determination of pH*

ISO 11423, *Water quality -- Determination of benzene and some derivatives*

ISO 12020, *Water quality — Determination of aluminium — Atomic absorption spectrometric methods*

ISO 13877, *Soil quality -- Determination of polynuclear aromatic hydrocarbons -- Method using high - performance liquid chromatography*

ISO 14402, *Water quality -- Determination of phenol index by flow analysis (FIA and CFA)*

ISO 15089, *Water quality -- Guidelines for selective immunoassays for the determination of plant treatment and pesticide agents*

ISO 16265, *Water quality -- Determination of the methylene blue active substances (MBAS) index -- Method using continuous flow analysis (CFA)*

ISO 16266, *Water quality — Detection and enumeration of pseudomonas aeruginosa — Method by membrane filtration*

ISO 22743, *Water quality -- Determination of sulfates -- Method by continuous flow analysis (CFA)*

ISO 9308-1

ISO 6059, *Water quality — Determination of the sum of calcium and magnesium — EDTA titrimetric method*

ISO 6222, *Water quality — Enumeration of culturable microorganisms — Colony count by inoculation in nutrient agar culture media*

ISO 6332, *Water quality — Determination of iron-spectrometric method using 1, 10-phenanthroline*

ISO 6461, *Water quality — Detection and enumeration of the spores of sulphite reducing anaerobes (clostridia)*

ISO 6785, *Milk and milk products -- Detection of Salmonella spp.*

ISO 7027, *Water quality — Determination of turbidity*

ISO 7393, *Water quality -- Determination of free chlorine and total chlorine*

ISO 7887, *Water quality — Examination and determination of colour*

ISO 7888, *Water quality — Determination of electrical conductivity*

ISO 7899, *Water quality — Detection and enumeration of intestinal enterococci*

ISO 7980, *Water quality -- Determination of calcium and magnesium -- Atomic absorption spectrometric method*

ISO 8165, *Water quality -- Determination of selected monovalent phenols*

ISO 8245, *Water quality — Guidelines for the determination of total organic carbon (TOC) and dissolved organic carbon (DOC)*

ISO 8288, *Water quality -- Determination of cobalt, nickel, copper, zinc, cadmium and lead -- Flame atomic absorption spectrometric methods*

ISO 9297, *Water quality — Determination of chloride — Silver nitrate titration with chromate indicator (Mohr's method)*

ISO 9308, *Water quality — Detection and enumeration of Escherichia coli and coliform bacteria*

ISO 9696, *Water quality -- Measurement of gross alpha activity in non-saline water -- Thick source method*

ISO 9697, *Water quality -- Measurement of gross beta activity in non-saline water -- Thick source method*

ISO 9964, *Water quality — Determination of sodium and potassium*

3 Terms and definitions

For the purposes of this standard, the following terms and definitions shall apply

3.1 packaged drinking water
water that has been suitably treated for human consumption filled and sealed in containers. It may contain minerals naturally occurring or intentionally added; it may contain carbon dioxide naturally occurring or intentionally added but does not contain sugars, sweeteners, flavourings or other food stuffs

NOTE Packaged drinking water refers to drinking water, carbonated drinking water/sparkling drinking water and alkaline drinking water.

3.2**Carbonated drinking water /sparkling drinking water**

drinking water which, after possible treatment and after packaging, has been made effervescent by the addition of carbon dioxide from another origin

3.3**alkaline drinking water**

Water meant for human consumption that has undergone treatment with alkalized filters or other permitted treatments to achieve a pH range of 8.6 to 10

3.3**artesian well water**

water from a well tapping a confined aquifer in which the water level stands at some height above the top of the aquifer

3.3**glacial water**

water which is derived from an approved source originating from and collected within a watershed containing a glacier, and is not derived from a public water system

3.4**spring water**

water derived from an underground formation from which water flows naturally to the surface of the earth

3.5**well water**

water from a hole bored, drilled, or otherwise constructed in the ground which taps the water of an aquifer

3.6**purified water or demineralized water**

water which has been processed by distillation, deionization, reverse osmosis, or other suitable process, and contains no added substance,

Alternatively, this water may be called:

- a) deionized water if it is processed by deionization;
- b) distilled water if the water has been processed by distillation; and
- c) reverse osmosis water if the water has been processed by reverse osmosis.

3.7**sterilized water**

water that is free from all types of microorganisms

3.8**enriched water**

water with added minerals

3.9**prepared waters**

water that originates from other types of water supply suitably prepared before packaging

3.10**potable water**

water that is safe and suitable for human consumption

3.11

drinking water

potable water intended for human consumption

3.12

treated water

water that has undergone through processes such as flocculation, coagulation, sedimentation, filtration and disinfection

3.13

water quality

the chemical, physical and biological characteristics of water in respect to suitability for human consumption

3.14

safe water

water that is free of physical, chemical and/or biological substances in concentrations which could cause illness or injury to consumers

3.15

surveillance

an independent continuous, specific measurement, observation and reporting for the purpose of water quality management and operational activities

3.16

disinfection

reduction by means of chemical agents and/or physical methods, of the number of micro-organism to a level that does not compromise public health

4 Requirements for packaged drinking water

4.1 General requirements

4.1.1 The location, construction, operation and supervision of water supply source, its reservoirs and its distribution system shall be subject of approval by the relevant authority

4.1.2 Packaged drinking water may optionally contain safe and permitted antimicrobial agents during processing.

4.1.3 Essential minerals may be optionally added and if added they shall be declared in the label.

4.1.4 Artesian water may be collected with the assistance of external force to enhance the natural underground pressure as long as such measures do not alter the physical properties, composition, and quality of water.

4.1.5 Spring water shall be collected only at the spring or through a borehole tapping the underground formation feeding the spring. There should be a natural force causing the water to flow to the surface through a natural orifice. The location of the spring shall be identifiable.

Spring water shall have all the physical properties, before treatment, and be of the same composition and quality, as the water that flows naturally to the surface of the earth.

4.1.6 Packaged drinking water shall be handled under hygienic conditions stipulated in EAS 39.

4.2 Specific requirements

4.2.1 physical characteristics

The physical characteristics affecting the quality of water

4.2.1.1 Packaged drinking water shall not have objectionable taste or odour to the consumers and shall be free from any foreign matter.

4.2.1.2 Packaged drinking water shall comply with the physical characteristics in Table 1.

Table 1 — Physical requirements

| Sl. No. | Characteristic | Limits | Method of test |
|---|------------------------|----------------|----------------|
| i) | Colour (TCU max) | 15 | ISO 7887 |
| ii) | Turbidity (NTU) | 1 max. (NTU) | ISO 7027 |
| iii) | pH ^{a)} | 6.5 – 8.5 | ISO 10523 |
| vii) | Total Suspended matter | Not detectable | ASTM D 5907-13 |
| a) For carbonated drinking water, the pH range shall be 4 -5.9. For alkaline drinking water, pH range shall be 8.6 - 10 | | | |

4.2.2 Chemical characteristics

4.2.2.1 Packaged drinking water shall comply with the chemical characteristics affecting quality indicated in Table 2

Table 2 — chemical characteristics for packaged drinking water

| Sl. No. | chemical characteristic | limits (mg/L max.) | test Method |
|---------|--|--------------------|----------------|
| ii) | Total dissolved solids | 1000 | ASTM D 5907-13 |
| iii) | Total organic matter | 0.003 | ISO 8245 |
| iv) | Total hardness, as CaCO ₃ , | 300 | ISO 6059 |
| v) | Aluminium, (Al) | 0.2 | ISO 12020 |
| vi) | Chloride, (Cl) | 250 | ISO 9297 |
| vi) | Iron (Fe) | 0.3 | ISO 6332 |
| vii) | Sodium,(Na) | 200 | ISO 9964-1 |
| viii) | Sulphate (SO ₄) | 400 | ISO 22743 |
| ix) | Zinc, (Zn ¹) | 5 | ISO 8288 |
| x) | Magnesium, (Mg) | 100 | ISO 7980 |
| xi) | Calcium, (Ca ¹) | 150 | ISO 7980 |
| xii) | Free residual chlorine (Cl ₂) | Not detectable | ISO 7393 |
| xiii) | potassium as (K), max | 50 mg/l | ISO 9964 |
| | | | |

4.2.2.2 Inorganic substances

Packaged drinking water shall comply with the limits of inorganic substances affecting safety indicated in Table 3.

Table 3 — Limits for inorganic substances in packaged drinking water

| Sl. No. | Substance | Limit mg/L, max. | Method of test |
|---------|--|---------------------|----------------|
| i) | Arsenic, (As) | 0.01 | ISO 11969 |
| ii) | Cadmium, (Cd) | 0.003 | ISO 5961 |
| iii) | Lead, (Pb) | 0.01 | ISO 8288 |
| iv) | Copper, (Cu) | 2.000 | ISO 8288 |
| v) | Mercury (total Hg ₂) | 0.001 | ISO 12846 |
| vi) | Manganese, (Mn) | 0.1 | ISO 6333 |
| vii) | Selenium, (Se) | 0.01 | ISO 9965 |
| viii) | Ammonia (NH ₃) | 0.5 | ISO 11732 |
| ix) | Chromium, (Cr) | 0.05 | ISO 9174 |
| x) | Nickel, (Ni) | 0.02 | ISO 8288 |
| xi) | Cyanide(CN) | 0.01 | ISO6703 |
| xii) | Barium, (Ba) | 0.7 | ISO 11885 |
| xiii) | Nitrate, (NO ₃) | 45 | ISO 7890 |
| xiv) | Boron(B) | 0.5 | ISO 9390 |
| xv) | Fluoride,(F) | 1.5 ^{a)} | ISO 10359 |
| xvi) | Bromate, (BrO ₃) | 0.01 | ISO 15061 |
| xvii) | Nitrite(NO ₂) | 0.5 | ISO 6777 |
| xviii) | Phosphates, (PO ₄ ³⁻) | 2.2 | ISO 15681 |
| xiv) | uranium | 0.03 | ASTM D 6239-9 |

a) If the product contains more than 1.0 mg/L fluoride, the following term shall appear on the label as part of, or in close proximity to the name of the product on in any otherwise prominent position "water contains fluoride".

4.2.3 Organic substances

Packaged drinking water shall comply with the limits of organic contaminants affecting safety indicated in Table 4.

Table 4 — Limits for organic substances in packaged drinking water

| Sl. No. | Substance (Arrange alphabetical order) | Limit µg/L max. | Method of test |
|--------------|---|-----------------|----------------|
| i) | <u>Aromatics</u> | | |
| | Benzene | 10 | ISO 11423 |
| | Toluene | 700 | |
| | Xylene | 500 | |
| | Polynuclear aromatic hydrocarbon | 0.7 | ISO 13877 |
| ii) | <u>Chlorinated Alkanes and Alkenes</u> | | |
| | Carbon tetrachloride | 2 | ISO 10301- |
| | 1,2-Dichloroethane | 30 | |
| | 1,1-Dichloroethylene | 0.3 | |
| | 1,1-Dichloroethene | 30 | |
| | Tetrachloroethene | 40 | |
| iii) | <u>Phenolic substances</u> | | |
| | Phenols | 2 | ISO 8165 |
| | 2,4,6-Trichlorophenol | 200 | ISO 14402 |
| iv) | <u>Trihalomethanes</u> | | |
| | Chloroform | 30 | ASTM D 3871-85 |
| v) | <u>Pesticides</u> | | |
| | Aldrin/Dieldrin | 0.03 | ISO 15089 |
| | Chlordane (total) | 0.3 | |
| | 2,4- Dichlorophenoxyacetic acid | 30 | |
| | DDT (total) | 1 | |
| | Heptachlor and Heptachlor Epoxide | 0.03 | |
| | Hexachlorobenzene | 1 | |
| | Lindane BHC | 2 | |
| Methoxychlor | 20 | | |
| vi) | Surfactants (reacting with methylene Blue) | 200 | ISO 16265 |
| viii) | Organic matter | 3 | ISO 8245- |

4.3 Microbiological contaminants

Packaged drinking water shall comply with the limits indicated in Table 5.

Table 5 — Microbiological limits for packaged drinking water

| Sl. No. | Type of micro-organism | Limits | Method of test |
|---------|---|--------|----------------|
| i) | Total viable counts at 22 °C in mL, max. ^{a)} | 100 | ISO 6222 |
| | Total viable counts at 37 °C, in mL, max. ^{a)} | 50 | |
| ii) | Total Coliforms in 100 mL | Absent | ISO 9308-1 |
| iii) | <i>E. Coli</i> in 100 mL | Absent | ISO 9308-1 |
| iv) | <i>Staphylococcus aureus</i> in 100 mL | Absent | ISO 6888-1 |
| v) | Sulphite reducing anaerobes in 100 mL | Absent | ISO 6461-2 |
| vi) | <i>Pseudomonas aeruginosa</i> fluorescence in 100 mL | Absent | ISO 16266 |
| vii) | <i>Streptococcus faecalis</i> in 100 mL | Absent | ISO 7899-2 |
| viii) | <i>Shigella</i> in 100 mL | Absent | ISO 21567 |
| ix) | <i>Salmonella</i> in 100 mL | Absent | ISO 6785 |
| x) | <i>cryptosporidium</i> | Absent | ISO 15553 |
| xi) | <i>Giardia</i> | Absent | |

^{a)} This parameter is for monitoring the system at source. Total time before analysis should be not more than 6 h at 4 °C. Determination of total viable counts shall start within 12 h after collection of the packaged drinking water sample.

4.4 Radioactive characteristics

Packaged drinking water shall comply with the limits for radioactive materials stipulated in Table 6.

Table 6 — Limits for radioactive materials in packaged drinking water

| Sl. No. | Radioactive material | Limits in Bq/L | Method of test |
|---------|----------------------|----------------|----------------|
| i) | Gross alpha activity | 0.5 | ISO 9696 |
| ii) | Gross beta activity | 1 | ISO 9697 |

5 Packaging

5.1 The product shall be packaged in sealed retail containers suitable for preventing the possible adulteration or contamination of water and shall be in accordance with environmental regulations of Partner States

5.2 The package shall be made from food grade material and strong enough to withstand normal handling and transportation.

6 Labelling

In addition to the requirements of EAS 38, the following specific labelling requirements shall apply and shall be legibly and indelibly marked.

6.1 The name of the product

6.1.1 The name of the product shall be as provided in the definition clauses

6.1.2 The label may provide the following composition: Na⁺, K⁺, Ca⁺⁺, Mg⁺⁺, Fe⁺⁺, Cl⁻, SO₄²⁻, F⁻, NO₃⁻ and bearing the pH and TDS

6.1.3 Packaged drinking water which contains carbon dioxide at levels than those naturally occurring in the source of the product shall be labelled with the words 'carbonated, carbonation added, or sparkling'.

6.2 Additional labelling requirements

6.2.2 Fluoride

Packaged water containing added fluoride shall be labeled "Fluoridated water". Any water that is called fluoridated water shall contain not less than 0.8 mg/L fluoride ion. The product should not contain more than 1.5 mg/L of fluoride.

6.2.3 Geographic location

The geographic location may be indicated on the label for artesian, spring or well water.

6.2.4 Water from water distribution system

When drinking water is supplied by a public or private tap water distribution system, the wording "From a public or private distribution system" must appear along with the name of the product on the front of the main label.

6.3 Labelling prohibitions

6.3.1 No claims concerning medicinal (preventive, alleviative or curative) or other beneficial effects relating to the health of the consumer shall be made in respect of the properties of the product covered by the standard.

6.3.2 The way in which labels on the packaged water are presented shall not cause confusion with other categories of water, particularly mineral waters, as defined in the EAS 13.

6.3.3 The use of any statement or of any pictorial device, which may create confusion in the mind of the public or in any way mislead the public about the nature, origin, composition and properties of packaged drinking water put on sale, is prohibited.

7.2 Parameters for minimum monitoring

It is recognized that, in many instances, the cost of performing a full analysis against Table 1, Table 2, Table 3, Table 4, Table 5, and Table 6 can be prohibitive.

Analysis of the parameters in Table 7 may be deemed acceptable for the purpose of indicating on going levels of operational efficiency in a water treatment plant. However, a relevant authority may require additional tests.

Table 7 — Parameters required for minimum monitoring

| Sl. No. | property | Test method |
|---------|--------------------------------------|-------------|
| a) | Conductivity or dissolved solids | Table 1 |
| b) | Colour | |
| c) | Turbidity; | |
| d) | Taste | |
| e) | Odour | |
| f) | pH value | |
| g) | Fluoride as F- | |
| h) | Nitrate | |
| i) | Aluminium | |
| j) | Iron(total) | |
| k) | Nitrite | |
| l) | Ammonia | |
| m) | Residual free chlorine | |
| n) | Faecal coliform bacteria or E. coli; | Table 5 |
| o) | Shigella spp | |
| p) | Salmonella spp | |

If abnormal results are encountered in any of these analyses, sampling frequency shall be increased and/or additional analyses carried out.

NOTE A consumer complaints register for the aesthetic qualities of the water should be maintained.

8 Sampling plan for packaged drinking water

Sampling plan shall be done in accordance with Annex B.

Annex A (normative)

Recommended hygienic practices

A.1 Field of application

This annex prescribes appropriate general techniques for collecting packaged drinking water, its treatment, bottling, packaging, storage, transport, distribution and sale for direct consumption, so as to guarantee a safe, healthy and wholesome product.

A.2 The definitions, terms and expressions used are the same as those given in Clause 3.

A.3 Prescriptions of the resources of packaged drinking water.

A.3.1 Protection of alimentary reservoirs and aquifers

A.3.1.1 Authorization

Packaged drinking water shall be recognized and approved as such by the relevant Authority having jurisdiction in the place of collection.

A.3.1.2 Determination of the genesis of mineral waters

As far as it is methodologically possible in each case, a precise analysis should be carried out on the origin of mineral waters, the period of their residence in the ground before being collected and their chemical and physical qualities.

A.3.1.3 Perimeter of protection

If possible areas wherein packaged drinking waters might be polluted or its chemical and physical qualities otherwise deteriorated should be determined by a relevant authority. Where indicated by hydrogeological conditions and considering the risks of pollution and physical, chemical and biochemical reactions, several perimeters with separate dimensions may be provided.

A.3.1.4 Protective measures

All possible precautions should be taken within the protected perimeters to avoid any pollution, of or external influence on, the chemical and physical qualities of packaged drinking water

It is recommended that regulations be established for the disposal of liquid, solid or gaseous waste, the use of substances that might deteriorate packaged drinking water (e.g. by agriculture) as well as for any possibility of accidental deterioration of mineral waters by natural occurrences such as a change in the hydrogeological conditions. Particular consideration should be given to the following potential pollutants: bacteria, viruses, fertilizers, hydrocarbons, detergents, pesticides, phenolic compounds, toxic metals, radioactive substances and other soluble organic or inorganic substances. Even where nature provides apparently sufficient protection against surface pollution, potential hazards should be taken into consideration, such as mining, hydraulic and engineering facilities etc.

A.3.2 Hygiene prescriptions for collection of mineral waters

A.3.2.1 Extraction

The withdrawal of packaged drinking water (from springs, galleries, genuine or drilled wells) shall be performed in conformity with the hydrogeological conditions in such a manner as to prevent any other than the packaged drinking water from entering or, should there be pumping facilities, prevent any extraneous water from entering by reducing the supply. The packaged drinking water thus collected or pumped should be protected in such a way that it will be safe from pollution whether caused by natural occurrence or actions or neglect or ill will.

A.3.2.2 Materials

The pipes, pumps or other possible devices coming into contact with packaged drinking water and used for its collection should be made of such material as to guarantee that the original qualities of packaged drinking water will not be changed.

A.3.2.3 Protection of the extraction area

In the immediate surroundings of springs and wells, precautionary measures should be taken to guarantee that no pollutant whatsoever could enter the extraction area. The extraction area should be inaccessible to non-authorized people by providing adequate devices (e.g. enclosure). Any use not aiming at the collection of mineral waters should be forbidden in this area.

A.3.2.4 The exploitation of natural mineral water

The condition of the extraction facilities, areas of extraction and perimeter protection as well as the quality of the packaged drinking water should periodically be checked. To control the stability of the chemical and physical particulars of the packaged drinking water derived, besides the natural variations, automatic measurements of the typical characteristics of water should be carried out and notified (e.g. electrical conductance, temperature, and content of carbon dioxide) or frequent partial analysis should be done.

A.3.3 Maintenance of extraction facilities

A.3.3.1 Technical aspects

Methods and procedures for maintaining the extraction facilities should be hygienic and not be a potential hazard to human health or a source of contamination to packaged drinking water. From the hygiene standpoint, servicing of the extraction installations should meet the same standards as those required for the bottling or treatment.

A.3.3.2 Equipment and reservoirs

Equipment and reservoirs used for extraction of packaged drinking water should be constructed and maintained in order to minimize all hazards to human health and to avoid contamination.

A.3.3.3 Storage at the point of extraction

The quantity of packaged drinking water stored at the point of extraction should be as low as possible. The storing should furthermore guarantee protection against contamination or deterioration.

A.3.4 Transport of packaged drinking water within an establishment and from the source

Packaging at the source is preferred.

A.3.4.1 Means of transport, piping and reservoirs

Any vehicle, piping or reservoir used in the processing of packaged drinking water from its source to the bottling facilities, the latter included, should comply with the necessary requirements and be made of inert material such as ceramic and stainless steel which prevents any deterioration, be it by water, handling, servicing or disinfection; it should allow easy cleaning.

A.3.4.2 Maintenance of vehicles and reservoirs

Any vehicle or reservoir should be properly cleaned and disinfected and kept in good repair so as not to present any danger of contamination to packaged drinking water and of deterioration of the essential qualities of packaged drinking water.

A.4 Establishment for processing packaged drinking water — Design and facilities

A.4.1 Location

Establishments should be located in areas, which are free from objectionable odours, smoke, dust or other contaminants and are not subject to flooding.

A.4.2 Roadways and areas used by wheeled traffic

Such roadways and areas serving the establishment, which are within its boundaries or in its immediate vicinity, should have a hard paved surface suitable for wheeled traffic. There should be adequate drainage and provision should be made for protection of the extraction area where appropriate and to allow for cleaning. Adequate road signals may be provided to call the attention of road users to the existence of mineral waters extraction area.

A.4.3 Building and facilities

A.4.3.1 Type of construction

Buildings and facilities should be of sound construction and maintained in good repair.

A.4.3.2 Disposition of holding facilities

Rooms for recreation, for storing or packaging of raw material and areas for the cleaning of containers to be reused should be apart from the bottling areas to prevent the end product from being contaminated. Raw and packaging materials and any other additions, which come into contact with mineral waters, should be stored apart from other material.

A.4.3.3 Adequate working space should be provided to allow for satisfactory performance of all operations.

A.4.3.4 The design should be such as to permit easy and adequate cleaning and to facilitate proper supervision of packaged drinking water hygiene.

A.4.3.5 The buildings and facilities should be designed to provide separation by partition, location or other effective means between those operations, which may cause cross-contamination.

A.4.3.6 Buildings and facilities should be designed to facilitate hygienic operations by means of a regulated flow in the process from the arrival of the packaged drinking water at the premises to the finished product, and should provide for appropriate temperature conditions for the process and the product.

A.4.3.7 packaged drinking water handling, storing and bottling areas

A.4.3.7.1 Floors

Where appropriate, should be of waterproof, non-absorbent, washable, non-slip and non-toxic materials, without crevices, and should be easy to clean and disinfect. Where appropriate, floors should slope sufficiently for liquids to drain to trapped outlets.

A.4.3.7.2 Walls

Where appropriate, should be of waterproof, non-absorbent, washable and non-toxic materials and should be light coloured. Up to a height appropriate for the operation they should be smooth and without crevices, and should be easy to clean and disinfect. Where appropriate, angles between walls, between walls and floors, and between walls and ceilings should be sealed and smoothed to facilitate cleaning.

A.4.3.7.3 Ceilings

Should be so designed, constructed and finished as to prevent the accumulation of dirt and minimize condensation, mould development and flaking, and should be easy to clean.

A.4.3.7.4 Windows

Windows and other openings should be so constructed as to avoid accumulation of dirt and those which open should be fitted with screens. Screens should be easily movable for cleaning and kept in good repair. Internal windowsills, if present, should be sloped to prevent use as shelves.

A.4.3.7.5 Doors

Should have smooth, non-absorbent surfaces and, where appropriate, be self-closing and close fitting.

A.4.3.7.6 Stairs, lift cages and auxiliary structures

Such as platforms, ladders, chutes; should be so situated and constructed as not to cause contamination to food. Chutes should be constructed with inspection and cleaning hatches.

A.4.3.7.7 Piping

Piping for packaged drinking water lines should be independent of potable and non-potable water.

A.4.3.8 In packaged drinking water handling areas all overhead structures and fittings should be installed in such a manner as to avoid contamination directly or indirectly of packaged drinking water and raw materials by condensation and drip, and should not hamper cleaning operations. They should be insulated where appropriate and be so designed and finished as to prevent the accumulation of dirt and to minimize condensation, mould development and flaking. They should be easy to clean.

A.4.3.9 Living quarters, toilets and areas where animals are kept should be completely separated from and should not open directly to mineral waters handling areas.

A.4.3.10 Where appropriate, establishments should be so designed that access can be controlled.

A.4.3.11 The use of material, which cannot be adequately cleaned and disinfected, such as wood, should be avoided unless its use would not be a source of contamination.

A.4.3.12 Canalization, drainage lines

Canalization and drainage and used water lines as well as any possible waste storage area within the protected perimeter should be built and maintained in such a manner as not to present any risk whatsoever of polluting aquifers and springs.

A.4.3.13 Fuel storage area

Any storage area or tank for the storing of fuels such as coal or hydrocarbons should be designed, protected, controlled and maintained in such a manner as not to present a risk of aquifers and springs being polluted during the storage and manipulation of these fuels.

A.4.4 Hygienic facilities

A.4.4.1 Water supply

A.4.4.1.1 Ample supply of packaged drinking water under adequate pressure and suitable temperature should be available with adequate facilities for its storage, where necessary, and distribution with adequate protection against contamination.

A.4.4.1.2 packaged drinking water, for steam production or for refrigeration or any other use should be carried in separate lines with no cross connection between them and without any chance of back siphonage. It would be desirable that these lines be identified by different colours. Steam used in direct contact with mineral waters and packaged drinking water contact surfaces should contain no substances, which may be hazardous to health or may contaminate the food.

A.4.4.2 Effluent and waste disposal

Establishments should have an efficient effluent and waste disposal system, which should at all times be maintained in good order and repair. All effluent lines (including sewer systems) should be large enough to carry full loads and should be so constructed as to avoid contamination of packaged drinking water supplies.

A.4.4.3 Changing facilities and toilets

Adequate, suitable and conveniently located changing facilities and toilets should be provided in all establishments. Toilets should be so designed as to ensure hygienic removal of waste matter. These areas should be well lighted, ventilated and where appropriate heated, and should not open directly to mineral waters handling areas. Hand washing facilities with warm or hot and cold water, a suitable hand-cleaning preparation, and with suitable hygienic means of drying hands, should be provided adjacent to toilets and in such a position that the employee will have to use them when returning to the processing area. Where hot and cold water are available mixing taps should be provided. Where paper towels are used, a sufficient number of dispensers and receptacles should be provided near each washing facility. Care should be taken that these receptacles for used paper towels are regularly emptied. Taps of a non-hand operatable type are desirable. Notices should be posted directing personnel to wash their hands after using the toilet.

A.4.4.4 Hand washing facilities in natural mineral water processing areas

Adequate and conveniently located facilities for hand washing and drying should be provided wherever the process demands. Where appropriate, facilities for hand disinfection should also be provided. Warm or hot and cold water should be available and taps for mixing the two should be provided. There should be suitable hygienic means of drying hands. Where paper towels are used, a sufficient number of dispensers and receptacles should be provided adjacent to each washing facility. Taps of a non-hand operatable type are desirable. The facilities should be furnished with properly trapped waste pipes leading to drains.

A.4.4.5 Disinfection facilities

Where appropriate, adequate facilities for cleaning and disinfection of working implements and equipment should be provided. These facilities should be constructed of corrosion resistant materials, capable of being

easily cleaned, and should be fitted with suitable means of supplying hot and cold water in sufficient quantities.

A.4.4.6 Lighting

Adequate natural or artificial lighting should be provided throughout the establishment. Where appropriate, the lighting should not alter colours and the intensity should not be less than:

- a) 540 lux (50 foot candles) at all inspection points;
- b) 220 lux (20 foot candles) in work rooms; and
- c) 110 lux (10 foot candles) in other areas.

Light bulbs and fixtures suspended over mineral waters in any stage of production should be of a safer type and protected to prevent contamination of mineral waters in case of breakage.

A.4.4.7 Ventilation

Adequate ventilation should be provided to prevent excessive heat, steam condensation and dust and to remove contaminated air. The direction of the airflow should never be from a dirty area to a clean area. Ventilation openings should be provided with a screen or other protecting enclosure of non-corrodible material. Screens should be easily removable for cleaning.

A.4.4.8 Facilities for storage of waste and inedible material

Facilities should be provided for the storage of waste and inedible material prior to removal from the establishment. These facilities should be designed to prevent access to waste or inedible material by pests and to avoid contamination of packaged drinking water, equipment, buildings or roadways on the premises.

A.4.5 Equipment and utensils

A.4.5.1 Materials

All equipment and utensils used in packaged drinking water handling areas and which may contact the packaged drinking water should be made of material which does not transmit toxic substances, odour or taste, is non-absorbent, is resistant to corrosion and is capable of withstanding repeated cleaning and disinfection. Surfaces should be smooth and free from pits and crevices. The use of wood and other materials, which cannot be adequately cleaned and disinfected, should be avoided except when their use would be a source of contamination. The use of different materials is exercised in such a way that contact corrosion that can occur should be avoided.

A.4.5.2 Hygienic design, construction and installation

All equipment and utensils should be so designed and constructed as to prevent hazards and permit easy and thorough cleaning and disinfection.

A.5 Establishment: Hygiene requirements

A.5.1 Maintenance

The buildings, equipment, utensils and all other physical facilities of the establishment, including drains, should be maintained in good repair and in an orderly condition. As far as practicable, rooms should be kept protected from steam, vapour and surplus water.

A.5.2 Cleaning and disinfection

A.5.2.1 Cleaning and disinfection should meet the requirements of this standard.

A.5.2.2 To prevent contamination of packaged drinking water, all equipment and utensils should be cleaned as frequently as necessary and disinfected, whenever circumstances demand.

A.5.2.3 Adequate precautions should be taken to prevent packaged drinking water from being contaminated during cleaning or disinfection of rooms, equipment or utensils, by water and detergents or by disinfectants and their solutions. Detergents and disinfectants should be suitable for the purpose intended and should be acceptable to the official agency having jurisdiction. Any residues of these agents on a surface, which may come in contact with packaged drinking water, should be removed by thorough rinsing with water, before they are or equipment is again used for handling packaged drinking water.

A.5.2.4 Either immediately after cessation of work for the day or at such other times as may be appropriate, floors, including drains, auxiliary structures and walls of packaged drinking water handling areas should be thoroughly cleaned.

A.5.2.5 Changing facilities and toilets should be kept clean at all times.

A.5.2.6 Roadways and yards in the immediate vicinity of and serving the premises should be kept clean.

A.5.3 Hygiene control programme

A permanent cleaning and disinfection schedule should be drawn up for each establishment to ensure that all areas are appropriately cleaned and that critical areas, equipment and material are designated for special attention. An individual, who should preferably be a permanent member of the staff of the establishment and whose duties should be independent of production, should be appointed to be responsible for the cleanliness of the establishment. He should have a thorough understanding of the significance of contamination and the hazards involved. All cleaning personnel should be well trained in cleaning techniques.

A.5.4 Storage and disposal of waste

Waste material should be handled in such a manner as to avoid contamination of packaged drinking water. Care should be taken to prevent access to waste by pests. Waste should be removed from packaged drinking water handling and other working areas as often as necessary and at least daily. Immediately after disposal of the waste, receptacles used for storage and any equipment, which has come into contact with the waste, should be cleaned and disinfected. The waste storage area should also be cleaned and disinfected.

A.5.5 Exclusion of animals

Animals that are uncontrolled or that could be a hazard to health should be excluded from establishments.

A.5.6 Pest control

A.5.6.1 There should be an effective and continuous programme for the control of pests. Establishments and surrounding areas should be regularly examined for evidence of infestation.

A.5.6.2 Should pests gain entrance to the establishment, eradication measures should be instituted. Control measures involving treatment with chemical, physical or biological agents should only be undertaken by or under direct supervision of personnel who have a thorough understanding of the potential hazards to health resulting from the use of these agents, including those hazards which may arise from residues retained in the packaged drinking water, such measures should only be carried out in accordance with the recommendations of the official agency having jurisdiction.

A.5.6.3 Pesticides should only be used if other precautionary measures cannot be used effectively. Before pesticides are applied, care should be taken to safeguard packaged drinking water equipment and

utensils from contamination. After application, contaminated equipment and utensils should be thoroughly cleaned to remove residues prior to being used again.

A.5.7 Storage of hazardous substances

A.5.7.1 Pesticides or other substances, which may present a hazard to health, should be suitably labeled with a warning about their toxicity and use. They should be stored in locked rooms or cabinets used only for that purpose and dispersed and handled only by authorized and properly trained personnel or by persons under strict supervision of trained personnel. Extreme care should be taken to avoid contamination of packaged drinking water.

A.5.7.2 Except when necessary for hygienic or processing purposes, no substance which could contaminate packaged drinking water should be used or stored in packaged drinking water handling areas.

A.5.8 Personal effects and clothing

Personal effects and clothing should not be deposited in packaged drinking water handling areas.

A.6 Personnel hygiene and health requirements

A.6.1 Hygiene training

Managers of establishments should arrange for adequate and continuing training of all packaged drinking water in hygienic handling of natural mineral water and in personal hygiene so that they understand the precautions necessary to prevent contamination of packaged drinking water.

A.6.2 Medical examination

Persons who come into contact with packaged drinking water in the course of their work should have a scheduled medical examination if the official agency having jurisdiction, acting on medical advice, considers that this is necessary, whether because of epidemiological considerations or the medical history of the prospective natural mineral water handler. Medical examination of packaged drinking water handlers should be carried out at other times when clinically or epidemiologically indicated.

A.6.3 Communicable diseases

The management should take care to ensure that no person, while known or suspected to be suffering from, or to be a carrier of a disease likely to be transmitted through food or while afflicted with infected wounds, skin infections, sores or with diarrhea, is permitted to work in any packaged drinking water handling area in any capacity in which there is any likelihood of such a person directly or indirectly contaminating packaged drinking water with pathogenic micro-organisms. Any person so affected should immediately report to the management.

A.6.4 Injuries

Any persons who has a cut or wound should not continue to handle packaged drinking water contact surfaces until the injury is completely protected by a waterproof covering which is firmly secured, and which is conspicuous in colour. Adequate first-aid facilities should be provided for this purpose.

A.6.5 Washing of hands

Every person, while on duty in a packaged drinking water handling area, should wash his hands frequently and thoroughly with a suitable hand cleaning preparation under running water. Hands should always be washed before commencing work, immediately after using the toilet, after handling contaminated material and whenever else necessary. After handling any material, which might be capable of transmitting disease, hands

should be washed and disinfected immediately. Notices requiring hand washing should be displayed. There should be adequate supervision to ensure compliance with this requirement.

A.6.6 Personal cleanliness

Every person engaged in packaged drinking water handling area should maintain a high degree of personal cleanliness while on duty, and should at all times while so engaged, wear suitable protective clothing including head covering and footwear, all of which should be cleanable, unless designed to be disposed of and should be maintained in a clean condition consistent with the nature of the work in which the person is engaged. Aprons and similar items should not be washed on the floor. When natural mineral water is manipulated by hand, any jewellery that cannot be adequately disinfected should be removed from the hands. Personnel should not wear any insecure jewellery when engaged in handling of natural mineral water.

A.6.7 Personal behavior

Any behavior, which could result in contamination of packaged drinking water, such as eating, use of tobacco, chewing (e.g. gum, sticks, betel nuts, etc) or unhygienic practices such as spitting, should be prohibited in packaged drinking water handling areas.

A.6.8 Visitors

Precautions should be taken to prevent visitors to natural mineral water handling areas from contaminating the product. These may include the use of protective clothing. Visitors should observe the provisions recommended in A.5.8, A.6.3, A.6.4 and A.6.7.

A.6.9 Supervision

Responsible for ensuring compliance by all personnel with all requirements of A.6.1 to A.6.8 inclusive should be specifically allocated to competent supervisory personnel.

A.7 Establishment-hygienic processing requirements

A.7.1 Raw material requirements

To guarantee a good and stable quality of packaged drinking water, certain criteria should be monitored regularly, namely,

- A.7.1.1** Spring discharge, temperature of the packaged drinking water.
- A.7.1.2** Appearance of the packaged drinking water.
- A.7.1.3** Odour and taste of the packaged drinking water.
- A.7.1.4** The conductance of packaged drinking water or any other adequate parameter.
- A.7.1.5** The microbiological flora.

A.7.2 Should there be a perceptible lack in meeting the standards; the necessary corrective measures are immediately to be taken.

A.7.3 Treatment

The treatment may include decantation, filtration, airing and where necessary application of off takes of carbon dioxide.

- A.7.3.1** Processing should be supervised by technically competent personnel.

A.7.3.2 All steps in the production process, including packaging, should be performed without unnecessary delay and under conditions which will prevent the possibility of contamination, deterioration, or the development of pathogenic and spoilage micro-organisms.

A.7.3.3 Rough treatment of containers should be avoided to prevent the possibility of contamination of the processed product.

A.7.3.4 Treatment and necessary controls should be such as to protect against contamination or development of a public health hazard and against deterioration within the limits of good commercial practice.

A.7.4 Packaging material and containers

A.7.4.1 All packaging material should be stored in a clean and hygienic manner. The material should be appropriate for the product to be packed and for the expected conditions of storage and should not transmit to the product objectionable substances beyond the limits acceptable to the official agency having jurisdiction. The packaging material should be sound and should provide appropriate protection from contamination. Only packaging material required for immediate use should be kept in the packing or filling area.

A.7.4.2 Product containers should not have been used for any purpose that may lead to contamination of the product. In case of new containers if there is a possibility that they have been contaminated, should be cleaned and disinfected. When chemicals are used for these purposes, the container should be rinsed as prescribed under A.5.2.3. Containers should be well drained after rinsing. Used and, when necessary, unused containers should be inspected immediately before filling.

A.7.5 Filling and sealing of containers

A.7.5.1 Packaging should be done under conditions that preclude the introduction of contaminants into the product.

A.7.5.2 The methods, equipment and material used for sealing should guarantee a tight and impervious sealing and should not damage the containers nor deteriorate the chemical bacteriological and organoleptic qualities of natural mineral water.

A.7.6 Packaging of containers

The packaging of containers should protect the latter from contamination and damage and allow appropriate handling and storing.

A.7.7 Lot identification

Each container shall be permanently marked in code or in clear to identify the producing factory and the lot. A lot is quantity of natural mineral water produced under identical conditions, all packages of which should bear a lot number that identifies the production during a particular time, interval, and usually from a particular "line" or other critical processing unit.

A.7.8 Processing and production records

Permanent, legible and dated records of pertinent processing and production details should be kept concerning each lot. These records should be retained for a period that exceeds the shelf life of the product. Records should also be kept of the initial distribution by lot.

A.7.9 Storage and transport of the end product

The end-product should be stored and transported under such conditions as will preclude contamination with and/or proliferation of micro-organisms and protect against deterioration of the product or damage to the container. During storage, periodic inspection of the end product should take place to ensure that only natural

mineral water, which is fit for human consumption, is dispatched and that end-product specifications should be complied with.

Annex B (normative)

Sampling plan for mineral waters

B.1 General requirements of sampling

B.1.1 In drawing, preparing, storing and handling samples, the following precautions and directions shall be observed;

- a) Sample shall be drawn in original sealed bottle/container and kept in protected place not exposed to damp air, dust or soot; and
- b) Each bottle/container in original shall be sealed and marked with full details of sampling.

B.1.2 Scale of sampling

B.1.2.1 Lot

The quantity of packaged mineral waters of the same type belonging to the same batch of manufacture and packed in a day, shall constitute a lot.

B.1.2.2 For ascertaining the conformity of the material to the requirements of the specification, samples shall be tested from each lot separately.

B.1.2.3 The number of containers to be selected from a lot shall depend on the size of the lot and shall be according to Table B.1.

Table B.1 — Scale of sampling

| Number of containers in the lot (L) | Sample size (2) |
|-------------------------------------|-----------------|
| $L \leq 5000$ | 3 |
| $5000 < L \leq 10000$ | 5 |
| $10000 < L \leq 15000$ | 7 |
| $L > 15000$ | 9 |

B.1.2.3.1 The containers shall be chosen at random from the lot. In order to ensure the randomness of selection, procedure given in ISO 24153;" Random sampling and randomization procedures shall be followed.

B.1.2.4 Initially the number of cartons equal to the number of containers to be taken from the lot (according to column 2 of Table B.1) shall be chosen at random. These cartons thus selected shall be opened and the containers in these cartons examined visually for the condition of packing, external appearance and the fill. The lot shall be considered satisfactory for inspection of other characteristics given in the specification, if all the containers in the cartons opened are found satisfactory for these characteristics.

B.1.2.5 In case of any defective container is found according to B.1.2.4, twice the number of cartons shall be opened and the container examined for these characteristics. If no defective container is found, the lot shall be considered satisfactory of inspection of other characteristics given in the specification.

B.1.3 Preparation of test samples

B.1.3.1 From each of the cartons opened according to B.1.2.4, three containers shall be taken from its different layers so as to obtain three times the required number of containers in the sample (see col. 2 of Table B.1).

B.1.3.2 In case the number of cartons to be opened is according to B.1.2.4, the number of cartons equal to the number of containers in the sample shall be taken at random from these cartons and then the required number of containers picked up according to B.1.3.1.

B.1.3.3 The sample bottles selected as in B.1.3.1 or B.1.3.2 shall be divided at random into three equal sets and labeled with all the particulars of sampling. One of these sets of sampled containers shall be for the purchaser, another for vendor and the third for referee.

B.1.3.4 Referee sample

Referee sample shall consist of a set of sample containers marked for this purpose and shall bear the deals of the purchaser and the supplier. These shall be kept at a place agreeable to the purchaser and the supplier so as to be used in case of a dispute between the two.

B.1.4 Criteria for conformity

The lot shall be declared as conforming to the requirements of the relevant specification if all the parameters are satisfied.

Annex C (informative)

Water safety plans

C.1 Packaged mineral waters operators shall develop, implement and maintain a water safety plan taking into consideration the potential risks to the safety of the water from the supply catchment area up to the consumer.

C.2 A water safety plan shall consist of three key components:

- a) system assessment to determine whether the mineral waters supply chain (up to the point of consumption) as a whole, can deliver water of a quality that meets health-based targets;
- b) identifying control measures in a mineral water system that will collectively control identified risks and ensure that the health-based targets are met; and
- c) management plans describing actions to be taken during normal operation or incident conditions, documenting the system assessment (including upgrade and improvement), monitoring, communication plans and supporting programmes.

C.3 A water safety plan shall include measures to protect the source of drinking water from risks of pollution.

- a) measures to ensure all installations intended for the production of drinking water exclude any possibility of contamination. For this purpose and in particular:
 - i) the installation for collection, the pipes and the reservoirs shall be made from materials suited to the water and in such a way as to prevent the introduction of foreign substances in water; and
 - ii) the equipment and its use for production shall meet hygienic requirements;
- b) measures to ensure an appropriate treatment such as pre-treatment processes, coagulation, flocculation, sedimentation, filtration and disinfection are undertaken to assure the safety of water for the consumers; and
- c) appropriate operational monitoring system including monitoring parameters that can be measured and for which limits have been set to define the operational effectiveness of the activity; frequency of monitoring and procedures for corrective action that can be implemented in response to deviation from limits. If, during production it is found that the water is polluted, the producer shall stop all operations until the cause of pollution is eliminated; and a verification plan to ensure that individual components of a mineral-waters system, and system as a whole is operating safely.

Annex D **(normative)**

Surveillance

D.1 General surveillance requirements

Mineral waters producers shall ensure, at all times, the quality and safety of the water that they produce. Public health surveillance (that is, surveillance of health status and trends) contributes to verifying drinking-water safety.

Adequate infrastructure, proper monitoring and effective planning and management; and a system of independent surveillance are basic and essential requirements to ensure the safety of mineral waters.

Surveillance shall cover the total supply network from the source of untreated water to the consumer delivery points.

A sampling programme that takes into consideration appropriate international recommendations shall be established and implemented. The sampling shall be regular and its frequency shall mainly depend on the following factors:

- a) quality of water harnessed including effects on the water from climatic, human and industrial activities;
- b) type of treatment for drinking worthiness;
- c) volume of water processed;
- d) risks of contamination;
- e) background of public water supply network;
- f) population served; and
- g) capabilities of the analytical facility (both in terms of capacity and in terms of analytical performance).

Bibliography

- [1] Guidelines for drinking water quality, fourth edition 2011, WHO.
- [2] Codex Stan 108 Adopted 1981, Amended 2011, Codex standard for natural mineral waters.

