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Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

DRS561 was prepared by Technical Committee RSB/TC 48, *Plastic tanks, pipes, accessories and related products*.

In the preparation of this standard, reference was made to the following standard:

FDUS 2662: 2023, *Ceramic water filters — Specifications*

The assistance derived from the above source is hereby acknowledged with thanks.

Committee membership

The following organizations were represented on the Technical Committee on *Plastic tanks, pipes, accessories and related products*, (RSB/TC 48) in the preparation of this standard.

Entreprise URWIBUSTO

Kigali Water Limited/METITO

MILTEC

ROTO Ltd

Prowater Ltd

RWACOM industry

Rwanda Plastic Industry

Rwanda Water Board (RWB)

SPOUTS OF WATER

Water Sanitation Corporation WASAC

Rwanda Standards Board(RSB) – Secretariat

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Ceramic water filters — Specification

1 Scope

This Draft Rwanda standard specifies requirements, sampling and test methods for ceramic water filter used to filter water for human consumption.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 D3866-18, *Standard Test Methods for Silver in Water*

RS ISO 9308-1, *Water quality — Enumeration of Escherichia coli and coliform bacteria — Part 1: Membrane filtration method for waters with low bacterial background flora*

RS ISO 11923, *Water quality — Determination of suspended solids by filtration through glass-fibre filters*

RS ISO 15681-2, *Water quality — Determination of orthophosphate and total phosphorus contents by flow analysis (FIA and CFA) — Part 2: Method by continuous flow analysis (CFA)*

RS ISO 17378-2, *Water quality — Determination of arsenic and antimony — Part 2: Method using hydride generation atomic absorption spectrometry (HG-AAS)*

RS ISO 15681- 2, *Water quality — Determination of orthophosphate and total phosphorus contents by flow analysis (FIA and CFA)*

RS ISO 4832, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coliforms — Colony-count technique*

RS ISO 5961, *Water quality — Determination of cadmium by atomic absorption spectrometry*

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

RS ISO 6333, *Water quality — Determination of manganese — Formaldoxime spectrometric method*

RS ISO 6461-2, *Water quality — Detection and enumeration of the spores of sulfite-reducing anaerobes (clostridia) — Part 2: Method by membrane filtration*

RS ISO 6777, *Water quality — Determination of nitrite — Molecular absorption spectrometric method*

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

RS ISO 6888-1, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species)*

RS ISO 7027-1, *Water quality — Determination of turbidity — Part 1: Quantitative methods*

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

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

RS ISO 7890-3, *Water quality — Determination of nitrate — Part 3: Spectrometric method using sulfosalicylic acid*

RS ISO 7899-2, *Water quality — Detection and enumeration of intestinal enterococci — Part 2: Membrane filtration method*

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

ISO 10359-2, *Water quality — Determination of fluoride — Part 2: Determination of inorganically bound total fluoride after digestion and distillation*

RS ISO 10523, *Water quality — Determination of pH*

RS ISO 12846, *Water quality — Determination of mercury — Method using Atomic Absorption Spectrometry (AAS) with and without enrichment*

RS ISO 16266-2, *Water quality — Detection and enumeration of Pseudomonas aeruginosa — Part 2: Membrane filtration method*

RS ISO 17378-2, *Water quality — Determination of arsenic and antimony — Part 2: Method using hydride generation atomic absorption spectrometry (HG-AAS)*

RS ISO 21567, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection of Shigella spp.*

3 Terms and definitions

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

3.1

ceramic

brittle, corrosion and heat resistant, inorganic non-metallic material produced by high-temperature processing

3.2**firing**

controlled heat treatment of ceramic ware in a kiln or furnace, during the process of manufacture, to develop the desired properties

3.3**unglazed**

hard, dense material of homogeneous composition, deriving colour and texture from materials of which the body is made

4 Material

4.1 The ceramic water filter shall be fired, unglazed porous ware and subsequently, suitably treated chemically so that fine silver is embedded in the body of the filter.

4.2 The manufacturer shall provide a suitable food grade material for cleaning the ceramic water filter.

5 Requirements**5.1 General requirements**

The ceramic water filter shall:

- a) be properly fired so as not to shed particles under conditions of normal use;
- b) be free from cavities, warpage, uneven firing and protrusion; and
- c) not have any cracks.
- d) not have carbon traces

5.2 Specific requirements

5.2.1 The ceramic water filter shall comply with the specific requirements given in Table 1 when tested in accordance with the test methods specified therein.

Table 1 — Specific requirements for ceramic water filter

S/N	Parameter	Requirement	Test method
i	Detection of internal cracks	To pass test	Annex A
ii	Rate of filtration, l/hr	To pass test	Annex B
iii	Presence of silver	To pass test	Annex C

5.2.2 Plastic receptacles that are used with ceramic water filter shall conform to FDEA 1080. receptacles other than from plastic product shall meet relevant requirements.

5.2.2 The ceramic water filter shall comply with the performance requirements given in Table 2 when the filtrate is tested in accordance with the test methods specified therein.

Table 2 — Performance requirements for the filtrate

S/N	Parameter	Requirement	Test method
i.	Suspended matter	Not detectable	ISO 11923
ii.	pH	6.5 – 8.5	ISO 10523
iii.	Conductivity, $\mu\text{S}/\text{cm}$, max.	1 500	ISO 7888
iv.	Colour, TCU, max.	15	ISO 7887
v.	Turbidity, NTU, max.	5	ISO 7027-1
vi.	Silver, mg/L, max.	0.1	ASTM D3866-18
vii.	Arsenic, mg/L, as As, max.	0.01	ISO 17378-2
viii.	Cadmium, mg/L, as Cd, max.	0.003	ISO 5961
ix.	Lead, mg/L, as Pb, max.	0.01	ISO 8288
x.	Copper, mg/L, as Cu, max.	1.000	
xi.	Mercury (total as Hg), mg/L, max.	0.001	ISO 12846
xii.	Manganese, mg/L, as Mn, max.	0.1	ISO 6333
xiii.	Nickel, mg/L, as Ni, max.	0.02	ISO 8288
xiv.	Nitrate as NO_3^- , mg/L, max.	45	ISO 7890-3
xv.	Nitrite, mg/L, max.	0.003	ISO 6777
xvi.	Phosphates, mg/L, as PO_4^{3-} , max.	2.2	ISO 15681-2
xvii.	Fluoride, mg/L, as F, max.	1.5	ISO 10359-2
xviii.	<i>Escherichia coli</i> , in 100 ml	Absent	ISO 9308-1
xix.	Total coliforms, in 100 ml	Absent	ISO 4832
xx.	Total viable counts at 22 °C, ml, max. ^{a)}	100	ISO 6222
xxi.	Total viable counts at 37 °C, ml, max. ^{a)}	50	
xxii.	<i>Staphylococcus aureus</i> in 100 ml	Absent	ISO 6888-1
xxiii.	Sulphite reducing anaerobes in 100 ml	Absent	ISO 6461-2
xxiv.	<i>Pseudomonas aeruginosa</i> fluorescence in 100 ml	Absent	ISO 16266-2
xxv.	<i>Streptococcus faecalis</i> in 100 ml	Absent	ISO 7899-2
xxvi.	<i>Shigella spp.</i> in 100 ml	absent	ISO 21567
xxvii.	<i>Salmonella spp.</i> in 100 ml	Absent	ISO 6785

^{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 potable water sample.

6 Packaging

The ceramic water filters and its components shall be packaged in suitable packaging material that ensure the product's integrity.

7 Labelling

7.1 The ceramic water filter shall be legibly and indelibly labelled with the following information:

- a) manufacturer's name and recognized trademark, if any;
- b) rate of filtration, in litres per hour (L/hr);
- c) capacity of filtering element in litres;
- d) lot/batch number;
- e) country of origin; and
- f) physical address of the manufacturer.

7.2 The manufacturer shall provide an information leaflet with the following information:

- a) "Clean the ceramic water filter every 7 days or when clogged";
- b) "Scrub the ceramic water filter with clean water and a suitable food grade material, as provided by the manufacturer. DO NOT use soap to clean the filter pot";
- c) "Wash the bucket, tap and lid with clean water and soap"; and
- d) "Replace the ceramic water filter after two (2) years of use or when the filtration rate is reduced".

8 Sampling

The sampling procedure and the criteria for conformity shall be as given in Annex D.

Annex A (normative)

Detection of internal cracks

A.1 Principle

This test is to detect internal cracks on the filter element.

A.2 Procedure

A.2.1 Submerge a filtering element in water only up to its rim, without letting water flow into the filter.

A.2.2 Hold It for about 10 s to see if any water seeps through the walls of the filter.

A.2.3 If water seeps through the walls of the filter after being submerged for the 10 s, it is an indication of internal cracks and the filter has failed this test.

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Annex B (normative)

Determination of rate of filtration

B.1 B.1 Apparatus

B.1.1 Calibrated T-Device to measure the change in water level

B.1.2 Stop watch

B.2 B.2 Procedure

B.2.1 Soak the filtering element for 24 h in a pool of water.

B.2.2 The soaked filter pots are removed from the pool and laid on a raised platform (racks).

B.2.3 Fill up the pot with clean water to full capacity.

B.2.4 A stopwatch is set for 1 h.

B.2.5 After 1 h of filtration, the water level in litres per hour is read from the calibrated T-Device.

B.2.6 The acceptable rate of filtration shall be as declared by the manufacturer.

NOTE See Figure B.1.



Figure B.1— Setup for determination of the rate of filtration

Annex C (normative)

Test for presence of silver

C.1 Preparation of the sample

Break the ceramic water filter, take sufficient quantity of pieces in agitated pestle and mortar and grind to fine powder to give more than 5 g of powder.

C.2 Reagents

C.2.1 Dilute nitric acid, 50 %, (v/v)

C.2.2 Dilute hydrochloric acid 35 %, (v/v)

C.2.3 Liquor ammonia

C.3 Procedure

C.3.1 Take 5 g of finely agated ceramic water filter material, wash with distilled water, allow the mixture to settle and decant the supernatant and wash out at least thrice. Decant the supernatant liquid.

C.3.2 Digest the residue with 50 ml of dilute nitric acid on a hot plate and allow settling.

C.3.3 Decant the supernatant liquid into a suitable glass tube.

C.3.4 Add into the glass tube a few mills of dilute hydrochloric acid.

C.3.5 If the solution shows white turbidity, confirm presence of silver by adding an excess of liquid ammonia, when the turbidity disappears.

Annex D (normative)

Sampling and criteria for conformity

D.1 Lot

D.1.1 In a consignment all the ceramic water filters, manufactured from the same type of material and belonging to the same batch of manufacture shall be grouped together to constitute a lot.

D.1.2 Each lot shall be tested for conformity to the requirements of this standard.

D.2 Scale of sampling and criteria for conformity

D.2.1 General

D.2.1.1 The number of ceramic water filters to be sampled from each lot depends on the size of the lot and shall be as given in Table D.1.

D.2.1.2 The ceramic water filters shall be selected at random making use of random number tables.

D.2.2 Detection of internal cracks

D.2.2.1 The number of ceramic water filters to be sampled for examining the above parameter is given in Column 3 of Table D.1.

D.2.2.2 Any ceramic water filter failing in one or more of the tests shall be termed defective.

D.2.2.3 The number of defective ceramic water filters shall not exceed the acceptance number in Column 4 of Table D.1, if the lot is to be accepted.

D.2.3 Tests for rate of filtration, presence of silver and all parameters in Table 2

D.2.3.1 The number of tests to be conducted for each of the above parameters is given in Column 5 of Table D.1.

D.2.3.2 For conducting these tests, sample test pieces shall be obtained from the sample ceramic water filters as described in the respective test methods.

D.2.3.3 No failures shall occur, if the lot is to be declared satisfactory.

Table D.1 — Scale of sampling and criteria for conformity

S/N	Lot size	Sample size for detection of cracks	Acceptance number	Number of tests for rate of filtration, presence of silver and all parameters for Table 2 and Table D.1
i.	Up to 25	3	0	1
ii.	26 to 50	5	0	1
iii.	51 to 100	8	1	2
iv.	101 to 200	13	1	3
v.	201 and above	20	2	4

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