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Indian Standard

SPECIFICATION FOR FILTERS FOR DRINKING WATER PURPOSES

(First Revision)

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Indian Standard

SPECIFICATION FOR FILTERS FOR DRINKING WATER PURPOSES

(First Revision)

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(*Continued on page* 12)

Indian Standard

SPECIFICATION FOR FILTERS FOR DRINKING WATER PURPOSES

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 28 February 1986, after the draft finalized by the Ceramicware Sectional Committee had been approved by the Chemical Division Council.

0.2 This standard was originally issued in two parts, Part 1 covering filter containers, and Part 2 covering filter candles. The filter candles prescribed in Part 2 of the original standard covered two types of filter candles, namley, Type 1 meant for filtration of suspended matter or sediment, and Type 2 meant for water filtration to free it from bacteria also.

0.3 In this revision, both parts have been amalgamated with a change in title as filters for drinking water purposes. Further, in this revision the design, pattern, material and dimension of containers and filter candles have been kept open and filter candle covered by Type 1 of the original standard has been deleted to give better protection to consumers. Filter candles conforming to this amalgamated standard are intended to give bacteria free water. The requirement for maximum pore diameter has been deleted; instead a method of test for detection of inadequate sealing has been prescribed; method for determination of rate of filtration has been modified; quantitative test for presence of silver and suspended particles have been included.

0.4 While preparing this standard, the Committee has emphasized that water filters will help in removing only the suspended matter and bacteria and will not filter any dissolved solids or chemicals. Water filters should, therefore, be used for filtering only that water which does not contain dissolved solids/chemicals beyond the permissible limits (*see* IS : 10500-1983*).

*Specification for drinking water.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for filter candles as well as filter containers for drinking water purposes.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 2781-1964†, and the following shall apply.

2.2 Capacity — It shall be indicated by lower container holding filtered water.

3. FILTER CANDLES

3.1 Material — Filter candles shall be fired, unglazed porous ceramicware and subsequently suitably treated chemically so that fine silver is embedded in the body of the filter candle.

3.1.1 *Workmanship and Finish* — Filter candle shall be regular in shape, symmetrical about their axis and properly fired so as not to shed particles under conditions of normal use. It shall also be free from large discrete cavities, warpage, uneven firing, protrusion and inadequate sealing. It shall have no visible cracks when seen from a distance of around 30 cm. It shall also pass the test for detection of cracks and inadequate sealing when tested by the method prescribed in Appendix A.

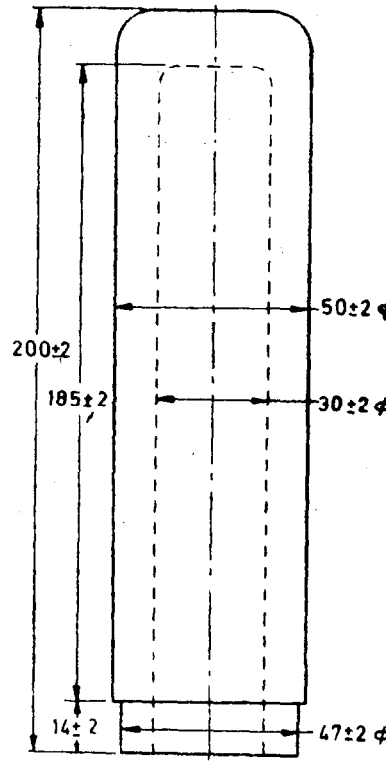
3.2 Requirements

3.2.1 *Dimensions* — Filter candles shall be of shape and size as agreed to between the purchaser and the supplier. However a conventional pattern and dimensions for filter candle are given in Fig. 1 for guidance.

3.2.1.1 Tolerance on all dimensions shall be $\pm$ 2 mm on the declared values.

3.2.2 *Rate of Filtrations* — When tested by the method prescribed in Appendix B, it shall be at least 1·5 litres per hour per candle.

*Rules for rounding off numerical values (*revised*).
†Glossary of terms relating to ceramicware (*first revision*).



All dimensions in millimetres.

FIG. 1 CERAMIC FILTER CANDLE

3.2.3 *Freedom from Bacteria* — Filter candles shall pass the test for freedom from bacteria when tested by the procedure given below.

3.2.3.1 Prepare a suspension of *Escherichia coli* (10^5 organisms per ml) and fill into a sterilized filter container fitted with the filter candle under test and collect the filtrate in a sterilized vessel. Test the filtrate for the presence of *E coli* as prescribed in **4, 5** and **6** of IS : 5887 (Part 1)-1976*.

3.2.4 *Presence of Silver* — When tested by the method prescribed in Appendix C, the test shall indicate the presence of silver.

*Methods for detection of bacteria responsible for food poisoning: Part 1 Isolation, identification and enumeration of *Escherichia coli* (*first revision*).

3.2.5 *Freedom from Suspended Particles* — The filter candle shall pass the test for freedom from suspended particles when the filtered water taken in a clear 250 ml beaker made of colourless glass, shall not show any suspended particles when examined visually from a distance of 30-35 cm.

3.2.6 *Filter Cap* — The material used in the manufacture of filter cap shall be stainless steel, polypropylene or brass coated with nickel. It shall be jointed to the filter candle by portland or any hydraulic cement or any other suitable binding material.

4. CONTAINERS

4.1 The material of construction for the containers shall be such proven material known to be safe for storage of drinking water.

NOTE 1 — Material like stoneware or vitreous enamels coated with leadless glaze (*see* IS : 2838-1964*); or high density polyethylene (*see* IS : 10146-1982†) or polypropylene (*see* IS : 10910-1984‡) or acrylonitrile butadiene styrene (ABS) or stainless steel or any suitable material may be used.

NOTE 2 — In case of containers made out of stoneware or virteous enamel, Jigmarks involved in course of firing shall be outside the contact area with filtered/unfiltered water avoiding the contamination with the base metal underneath the enamel coating.

NOTE 3 — *Toxic Test* — Whenever, lead is suspected in the glaze, it shall comply to the limits 2·5 mg/l when tested as per the method prescribed in IS : 9806-1981§.

4.2 Capacity — The capacity of the lower container shall be minimum 8 litres. The capacity of the upper container shall not be less than the lower container and shall not exceed one and quarter times more than the capacity of the lower container.

4.3 Workmanship and Finish — The containers shall be regular in shape smoothly finished and free from cracks and imperfections. They shall be symmetrical (except for projections on the upper container for lifting) about the axis which shall be perpendicular to the base. The upper container shall be provided with hole(s) in the base for fixing the candle(s). The lower container shall be provided with hole of suitable size near the base for fixing a tap for draining water. The base of the lower container shall enable the container to stand vertically without rocking or spinning on a plain horizontal surface.

4.3.1 The upper container, the lower container and the lid of the upper container shall fit in such a manner that there would be no contamination of dust in the respective containers.

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*Specification for stoneware containers for general purposes.

†Specification for polyethylene for its safe use in contact with foodstuffs, pharmaceuticals and drinking water.

‡Specification for polypropylene and its copolymers for its safe use in contact with foodstuffs, pharmaceuticals and drinking water.

§Method of test for and permissible limits of toxic materials released from ceramicware in contact with food.

4.4 Leakage — The entire assembly shall be leakproof. Filter candles may be fitted with washers so as to ensure that no unfiltered water trickles in the lower container.

5. OTHER ACCESSORIES

5.1 Brush — The manufacturer shall provide a suitable non-metallic brush for cleaning the filter candle and the containers.

6. PACKING AND MARKING

6.1 Packing — The filter candles and filters shall be packed as agreed to between the purchaser and the supplier.

6.2 Marking — The filter candles and filters shall be marked with the following information:

a) Manufacturer's name and his recognized trade-mark, if any;
b) Rate of filtration;
c) Capacity of lower container in litres; and
d) Lot number or batch number to enable the batch to be traced from records.

6.2.1 In addition, the manufacturer shall provide an information leaflet covering the volume of filtered water after which brushing is necessary and prescribing the time limit after which the filter candle be changed.

6.2.2 The filter candles and filters may also be marked with the Standard Mark.

6.2.3 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manfucaturers or producers may be obtained from the Bureau of Indian Standards.

7. SAMPLING

7.1 Representative samples of filter candles and filters shall be drawn and adjudged for conformity to this specification as prescribed in Appendix D.

APPENDIX A

(*Clause* 3.1.1)

TEST FOR DETECTION OF INADEQUATE SEALING

A-1. APPARATUS

A-1.1 A suitable apparatus as illustrated in Fig. 2.

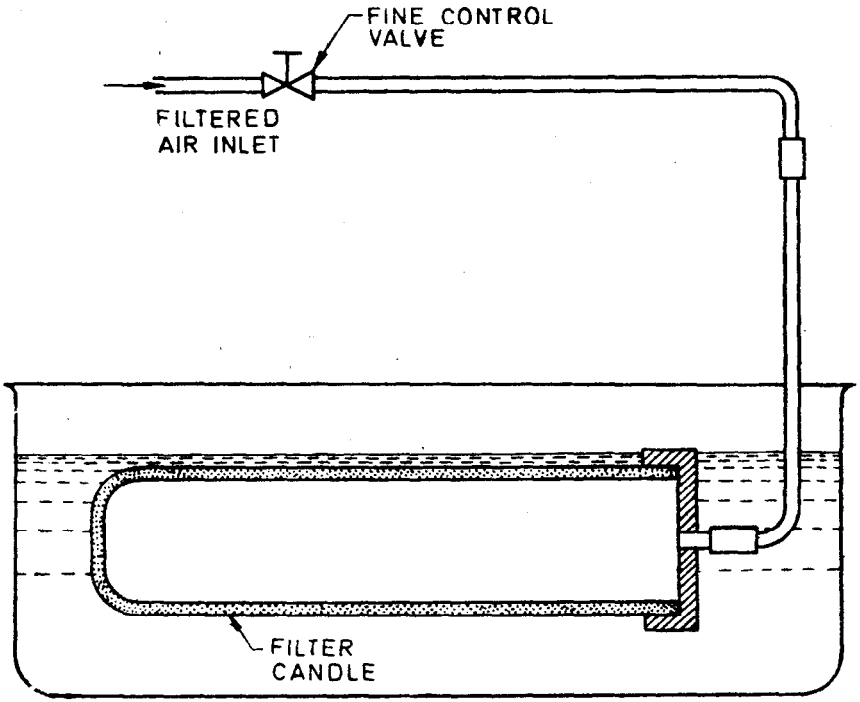

FIG. 2 APPARATUS FOR DETERMINATION OF HIDDEN CRAKES OR LARGE DISCRETE CAVITIES

A-2. PROCEDURE

A-2.1 Thoroughly clean the filter candle under test. Draw a line parallel to the axis so that the candle is divided into halves representing 2 distinct faces *A* and *B* of the candle. Soak the filter candle for sufficient (say $\frac{1}{2}$ hr) time in distilled water. Connect the soaked filter candle to a controllable source of clean, compressed air (*see* Fig. 2). Immerse the filter candle just below the surface of distilled water with face *A* upwards and gradually increase the air pressure by operating the pressure

controller until the bubbles passes through the filter candle and rises through the water. Observe the leakage at the joint point of the filter cap and the filter candle. If there is no leakage from the joint point of the filter cap and the filter candle, it indicates adequate sealing. Repeat the same with face *B* upward.

A-2.2 The material shall be deemed to have passed the test if there is no bubble at the joint point of filter cap and the filter candle and also no concentration of bubbles at any area (dia 4 mm or more) in the body of the candle

APPENDIX B

(*Clause* 3.2.2)

DETERMINATION OF RATE OF FILTRATION

B-1. PROCEDURE

B-1.1 Thoroughly clean and dry the filter candle under test. Place the candle in a vessel, evacuate the latter to 700 mm of mercury and admit sufficient freshly boiled and cooled distilled water to cover the filter candle while the system is still under vacuum; gradually admit air into the vessel till the pressure difference is neutralized. Allow the filter candle to be soaked for at least 20 minutes. Fix the filter candle in the upper chamber of the container. Fill water so that entire candle is immersed in water and the water above the candle shall be not less than 5 cm. Mark the water level and maintain the same during the test. Make sure that there is no leakage from the body or inadequate sealing of the candle into the holder of the filter or cap. Discard the filtrate for sometime. Note the time of start of collection of water in the lower chamber of water filter. After an interval of one hour, remove the upper chamber and measure the volume of water collected in the lower chamber.

APPENDIX C

(*Clause* 3.2.4)

METHOD OF TESTING FOR PRESENCE OF SILVER

C-1. PREPARATION OF SAMPLE

C-1.1 Break filter candle and take sufficient quantity of pieces in agated pestle and mortar and grind it to fine powder to give more than 5 g of powder.

C-2. REAGENTS

C-2.1 Dilute Nitric Acid 50 Percent (*v/v*) — (*see* IS : 264-1976*).

C-2.2 Dilute Hydrochloric Acid 35 Percent (*v/v*) — (*see* IS : 265-1976†).

C-2.3 Liquor Ammonia — (*see* IS : 799-1978‡).

C-3. PROCEDURE

C-3.1 Take 5 g of finely agated filter candle material, wash with distilled water, allow to settle the mixture and decant the supernatant and wash out at least thrice and decant the supernatant liquid. Digest the residue with 50 ml of dilute nitric acid on a hot plate and allow to settle. Decant the supernatant liquid into a suitable glass tube. Add into the glass tube a few ml of dilute HCl. If solution shows white turbidity, confirm presence of silver by adding an exesses of liquid ammonia, when the turbidity will disappear.

APPENDIX D

(*Clause* 7.1)

SAMPLING OF FILTERS

D-1. LOT

D-1.1 In a consignment all the filter condles and filters of the same nominal capacity, manufactured from the same type of material and belonging to the same batch of manufacture shall be grouped together to form a lot. Each lot shall be tested for conformity to the requirements of this specification.

D-2. SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

D-2.1 The number of filter candles and filters to be sampled from each lot depends on the size of the lot and shall be as given in col 1 and 2 of Table 1. These filter candles and filters shall be selected at random making use of random number tables. For random selection procedures reference may be made to IS : 4905-1968§.

*Specification for nitric acid (*second revision*).
†Specification for hydrochloric acid (*second revision*).
‡Specification for liquor ammonia, technical (*first revision*).
§Methods for random sampling.

TABLE 1 SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

LOT SIZE	SAMPLE SIZE FOR VISUAL AND DIMENSIONAL TESTS (3.1.1, 3.2.1, 3.2.6, 4.2, 4.3 and 4.4)	ACCEPTANCE NO.	NO. OF TESTS FOR EACH PROPERTY (3.2.2 to 3.2.5)
(1)	(2)	(3)	(4)
Up to 25	3	0	1
26 to 50	5	0	1
51 to 100	8	1	2
101 to 200	13	1	3
201 and above	20	2	4

D-2.2 Workmanship and Finish Dimensions, Capacity, Filter Cap and Leakage — The number of filter candles and filters be sampled for examining the above characteristics is given in col 2 of Table 1. Any filter candles and filters failing in one or more of the tests shall be termed defective. The number of defective filter candles and filters shall not exceed the acceptance number (*see* col 3) if the lot is to be accepted under this clause.

D-2.3 Tests for Rate of Filtration, Free from Bacteria, Presence of Silver, Freedom from Suspended Particles — The number of tests to be conducted for each of the above properties is given in col 4 of Table 1. For conducting these tests, sample test pieces shall be obtained from sample filter candles and filters as described in respective test methods. No failures shall occur if the lot is to be declared satisfactory under this clause.

(*Continued from page* 2)

Panel for Waterfilters, CDC 27 : 3 : P1

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DR B. N. SAMADDAR	College of Ceramic Technology, Calcutta
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AMENDMENT NO. 1 JUNE 1988

TO

IS : 7402-1986 SPECIFICATION FOR FILTERS FOR DRINKING WATER PURPOSES

(First Revision)

(*Page* 5, *Fig.* 1) — Substitute ' 171 $\pm$ 2 ' *for* ' 185 $\pm$ 2 '.

(*Page* 9, *clause* **B-1**) — Substitute the following for the existing matter:

'**B-1.1** Thoroughly clean and dry the filter candle under test. Fix the filter candle in the holder in the upper chamber of the container. Fill water in the container so that entire candle is immersed in water. Maintain the water level in such a way that the candle always remains immersed in the water. It shall be ensured that there is no leakage from the body or inadequate sealing of the candle into the holder of the filter or cap. Allow the filter candle to remain immersed in water for filtration for a minimum period of 12 hours and reject the filtered water obtained in the lower chamber. During this period the entire entrapped air in the capillary channel is removed.

B-1.2 Mark the water level at a height of 5 cm above the candle and maintain it at this level throughout the test. Note the time at the start of collection of water in the lower chamber of water filter. After an interval of one hour remove the upper chamber and measure the volume of water collected in the lower chamber.'

(CDC 27)

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AMENDMENT NO. 2 FEBRUARY 1993
TO
IS 7402 : 1986 SPECIFICATION FOR FILTERS FOR DRINKING WATER PURPOSES

(First Revision)

(*Page* 6, *clause* **4.2**, *line* 1) — Insert the words 'fitted with upper container' after the word 'container'.

(*Page* 6, *clause* **4.2**, *line* 2) — Insert the words 'fitted with filter' after the word 'container'.

(CHD 009)

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