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(दूसरा पुनरीक्षण)

Draft Indian Standard

Liquid Toilet Cleaner – Hydrochloric Acid Based — Specification

(Second Revision)

ICS 71.100.40

Soap, Detergent and Surface Active Agent, Sectional Committee, CHD 25	Last date of comments: 22nd July 2025

FOREWORD

(*Formal clause to be added later*)

Liquid toilet cleaner – hydrochloric acid, based cleaning solution is used for removing stains and hard water deposits from toilet bowl made up of porcelain and of steel and cast-iron toilet bowl covered with a coating of acid-resistant porcelain enamel. Supervision would be required to prevent injury and misuse of the product. This product shall not be used on the toilet bowls which are without acid-resistant porcelain enamel coating, as it can cause severe etching, leading to increased maintenance issues.

This standard was first published in 1976 and subsequently revised in 1994. In the first revision, title was changed to bring it in line with the prevailing practices and the additional requirement for removal of lime scales was added and marking clause was updated to provide waring against the corrosive nature of the solution.

In this second revision, the following modifications have been incorporated:

a) The title has been changed to align with the scope and to bring it in line with the prevailing practice in the present-day trade;
b) The reference clause has been updated;
c) The requirement for complete miscibility in water has been incorporated, and total acid content requirement has been modified as 7.0 percent to 13 percent by mass, the requirement for rust stain removal is modified to 30 min and the requirement for keeping quality has been modified.
d) The requirement of sediment has been removed;
e) The packaging and marking clause has been updated; and
f) Amendment 1 has been incorporated;

The clause **5.1.1**, **5.1.2, 7.1, F.2.1, F.2.4** and **F.3.1** of this standard call for agreement between the purchaser and the supplier.

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 or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Draft Indian Standard

LIQUID TOILET CLEANER – HYDROCHLORIC ACID BASED – SPECIFICATION

(Second Revision)

1 SCOPE

1.1 This standard prescribes requirements and methods of sampling and test for hydrochloric acid liquid toilet cleaner for toilet bowl made up of porcelain and of steel and cast-iron toilet bowl covered with a coating of acid-resistant porcelain enamel.

1.2 This product shall not be used on the toilet bowls which are without acid-resistant porcelain enamel coating

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of these standards:

IS No.	*Title*
IS 1070: 2023	Reagent Grade Water — Specification (*fourth revision*)
IS 8171: 2024	Polishes and related materials — Glossary of terms (*third revision*)
IS 1570 (Part 2/Sec 1) : 1979	Schedules for wrought steels: Part 2 Carbon steels (unalloyed steels), Section 1 Wrought products (other than wires) with specified chemical composition and related properties (*first revision*)

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS 8171, shall apply in addition to the following .

3.1.1 *Ambient Temperature* — It is the temperature between 21 °C and 38 °C.

4 REQUIREMENTS

4.1 Description

4.1.1 The material shall be clear, homogeneous liquid with or without colour.

4.1.2 The material shall be miscible in water in all proportions.

4.1.3 The material shall contain hydrochloric acid and any necessary wetting agents, inhibitors, and other desirable additives. The ingredients used in the manufacture of the material shall be intimately mixed and processed and shall be suitable for the intended purpose.

4.2 Acid Content

Total acid content shall be between 7.0 percent and 13 percent by mass when tested in accordance with Annex A.

4.3 Efficacy

4.3.1 The material shall be able to remove rust stains within 30 min when tested in accordance with Annex B.

4.3.2 It shall remove the lime scales when tested in accordance with Annex C.

4.4 Effect on Porcelain Enamel

The material shall have no etching effect on porcelain when tested in accordance with Annex D.

4.5 Corrosion Inhibition

The material shall be correctly inhibited to minimize metallic corrosion. When tested in accordance with Annex E, the loss in mass of the metal shall not exceed 0.15 percent.

4.6 Keeping Quality

The toilet cleaner, liquid shall conform to the requirements prescribed in **4.1** to **4.5** for 18 months from the date of manufacture or as per the shelf life declared by the manufacturer, whichever is higher, when stored in original sealed containers at ambient temperature.

5 PACKING AND MARKING

5.1 Packing

5.1.1 The size of the containers shall be as agreed to between the purchaser and the supplier.

5.1.2 The containers shall be packed in cartons, and the cartons, in turn, in cardboard boxes, or as agreed to between the purchaser and the supplier.

5.2 Marking

The container shall be marked with the following information:

a) Indication of the source of manufacture;
b) Net mass or volume of the material, when packed;
c) The words ‘Toilet Cleaner Liquid, Acid-based’;
d) Instructions for use;
e) Batch/Code number for identification;

f) Month and year of manufacture, date of expiry;
g) Warning: 'Corrosive. Do not mix with bleach or other toilet cleaners. Use only for toilet bowls. Keep the bottle out of reach of children. Avoid contact with skin and eyes. In case of accidental contact with eyes and skin, wash off immediately with water and seek medical advice. If swallowed, rinse mouth with water.'; and
h) Any other marking required under the *Legal Metrology (Packaged Commodities) Rules*, 2011 may also be given.

5.2.2 *BIS Certification Marking*

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed there under, and the products may be marked with the Standard Mark.

6 TEST METHOD

6.1 Tests shall be carried out as prescribed in this standard.

6.2 Quality of reagent

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be used in tests

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

7 SAMPLING AND CRITERIA FOR CONFORMITY

The method of preparation and drawl of samples of the material and the criteria for conformity shall be as given in Annex F or as agreed to between the purchaser and the supplier.

ANNEX A

(*Clause* 4.2)

DETERMINATION OF ACID CONTENT

A-1 REAGENTS

A-1.1 Standard sodium hydroxide solution, 0.2 N.

A-1.2 Methyl Orange or Phenolphthalein Indicator Solution

Dissolve 0.05 g of methyl orange in 100 ml of water or phenolphthalein indicator solution.

A-2 Procedure

Weigh a glass-stoppered conical flask containing about 30 ml of distilled water. Add rapidly 3 g to 4 g of the thoroughly mixed sample, stopper and reweigh. Dilute to 50 ml with water and titrate with standard sodium hydroxide solution using methyl orange or phenolphthalein as indicator

A-3 Calculation

$$\text{Acid content, percent by mass} = \frac{\text{V} \times \text{N} \times \text{C}}{\text{M}}$$

where

V = volume in ml, of standard sodium hydroxide solution used in titration;

N = normality of standard sodium hydroxide solution used;

M = mass in g, of the sample taken for the test; and

C = 0.3647 for HCl

ANNEX B

(*Clause* 4.3.1)

TEST FOR EFFICACY

B-1 Apparatus

B-1.1 Hot air gun or any suitable equipment to blow dry the stain, laboratory oven, weighing balance, fine mist sprayer**.**

B-2 Reagents

B-2.1 Ferric Chloride Solution

2 percent aqueous solution of ferric chloride hexahydrate ($FeCl_3.6H_2O$).

B-2.2 Sodium Hydroxide Solution

1 percent aqueous solution of Sodium Hydroxide (NaOH).

B-2.3 Alcohol

Alcohol (Ethyl alcohol or iso-propyl alcohol, whichever is suitable).

B-3 Procedure

B-3.1 Preparation of Stained Tiles

Always use new, clean ceramic tiles. Clean the tiles with alcohol and dry in an oven. Heat the surface of the tile with a hot air gun. Using a fine mist sprayer, cover the surface of the tile with ferric chloride solution, heat the tile till completely dry. Using a fine mist sprayer, cover the surface of the tile with sodium hydroxide solution, heat the tile till completely dry. Allow the tile to cool to room temperature. Rinse under running tap water and let it air dry. Repeat the above process to get a rust stain of desired intensity.

B-3.2 Cleaning

Apply the desired amount of product on the rust-stained tile and leave the sample to react for up to 30 min, rinse the tile under tap water, dry and then note the colour of the tile. The original white appearance of the tile should be restored.

ANNEX C

(*Clause* 4.3.2)

TEST FOR LIMESCALES

C-1 APPARATUS

A smooth, white marble cuboid of size 2.8 cm × 2.8 cm × 1.5 cm.

C-2 Procedure

C-2.1 Rub with a 00 grade carborandum paper all sides of the cube. Gently brush away the powdered marble with a soft camel hair brush.

C-2.2 Rinse the cube in running distilled or deionized water for about 1 min.The weight of the porcelain dish is (W_1) and the weight of the porcelain dish with the cube when dried at (105 ± 2) ˚C to a constant mass is (W_2). Cool in a desiccator and weigh.

Mass of the cube in g, W_i (Initial weight) = W_2 -W_1

C-2.3 Prepare a bed of 2 mm to 3 mm diameter glass balls inside a 250 ml glass beaker. Place the marble cube with the flat surface resting on glass balls bed.

C-2.4 Pour 50 ml of the material and wait for 10 seconds. Drain off the product within another 10 seconds and allow the cube to remain in the glass beaker for a total period of 30 min.

C-2.5 Rinse the cube with distilled or demineralized water for about 10 min. The weight of the porcelain dish is (W_3) and the weight of the Porcelain dish with the cube when dried at (105 ± 2) ˚C to a constant mass is (W_4).

Mass of the cube in g, W_f (Final weight) = W_4 - W_3

Percentage loss of mass in g = $\frac{initial\ weight - final\ weight}{initial\ weight} * 100 = \frac{(W_2 - W_1) - (W_4 - W_3)}{(W_2 - W_1)} * 100$

where

W_1 = weight of porcelain dish in g;

W_2 = weight of the porcelain dish with the cube when dried at (105 ± 2) ˚C to a constant mass in g;

W_3 = weight of porcelain dish after rinse in g; and

W_4 = weight of the porcelain dish with the cube when dried at (105 ± 2) ˚C to a constant mass after rinse in g.

C-2.6 The mass of loss of marble should not be less than 1.0 percent.

ANNEX D

(*Clause* 4.4)

TEST FOR EFFECT ON PORCELAIN ENAMEL

D-1 APPARATUS

D-1.1 Porcelain Enamel Plate

New 70 mm × 70 mm white porcelain acid-resistant enamelled steel plate. The enamelling shall be 1 mm.

D-2 Procedure

Place approximately one gram of diatomaceous earth on the plate (*see* **C-1**) to make a 16 mm diameter circle with a depth of 10 mm and saturate the earth with 2 ml of the sample. Cover the wetted area with a watch glass and set aside for 16 hours. At the expiry of 16 h, wash using a rag or sponge, dry the plate and examine with a 5 × magnifying glass for any etching by comparing with a new plate, under good lighting conditions.

ANNEX E

(*Clause* 4.5)

DETERMINATION OF CORROSION INHIBITION

E-1 PREPARATION OF TEST SPECIMEN

Take new 50 mm × 50 mm × 1 mm pieces of hot-rolled steel, conforming to **C-10** of IS 1570 (Part 2/Sec 1). Descale by immersing in concentrated hydrochloric acid. The specimens shall then be rinsed, first with tap water, next with distilled water, and finally with acetone. Dry the specimens at (105 ± 2) °C for 15 min. Weigh the specimens to the nearest milligram and store in a desiccator. Proceed with the test with, specimens prepared on the same day of the test.

E-2 Procedure

Take 3 new specimens prepared as in **E-1** and place in 250 ml beakers, one specimen in one beaker. Rest the specimen on a section of 3 mm glass rod bent to V shape. Add 200 ml of the sample to each beaker. Allow the sample to remain unagitated in contact with the metal specimen for 24 h at room temperature. Remove the specimen after 24 h, rinse two or three times with distilled water, and finally rinse with acetone, dry at (105 ± 2) °C for 15 min, and weigh again.

E-3 Calculation

$$Percent\ loss\ in\ mass\ of\ the\ metal = \frac{W_1 - W_2}{W_1}$$

where

W_1 = mass in g, of the test specimen before immersion; and

W_2 = mass in g, of the test specimen after immersion.

ANNEX F

(*Clause* 7)

SAMPLING OF TOILET CLEANER, LIQUID, ACID-BASED

F-1 GENERAL REQUIREMENTS FOR SAMPLING

F-1.1 In drawing, preparing, storing and handling test samples, the following precautions, and directions shall be observed.

F-1.2 Samples shall be taken in a protected place not exposed to damp air, dust or soot.

F-l.3 The sampling instrument shall be clean, and dry when used.

F-1.4 Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from adventitious contamination.

F-l.5 The samples shall be placed in clean, dry and airtight glass or other suitable containers on which the material has no action.

F-1.6 The sample containers shall be of such a size that they are almost completely filled by the sample.

F-1.7 Each sample container shall be sealed airtight after filling and marked with full details of sampling, the date of sampling and the year of manufacture of the material.

F-1.8 Samples shall be stored in such a manner that the temperature of the material does not vary unduly from the ambient temperature.

F-2 SCALE OF SAMPLING

F-2.1 To determine the conformity of a consignment of cleaning solution to this standard, samples shall be selected so as to be representative of the whole consignment. In the absence of any prior agreement between the purchaser and the supplier on the mode of sampling and determining the criteria of conformity, the following sampling scheme is recommended to serve as a guide.

F-2.2 Lot

All the containers in a single consignment of the material drawn from the same batch of manufacture and of the same size shall constitute a lot. If a consignment is declared or known to consist of different batches of manufacture or of different sizes of containers, the containers. belonging to the same batch and size shall be grouped together and each such, group shall constitute a separate lot.

F-2.2.1 Samples shall be tested for each lot for ascertaining the conformity of the material to the requirements of this standard.

F-2.3 The number of containers (*n*) to be chosen from a lot shall depend upon the size of the lot (*N*) and shall be in accordance with Table 1.

Table 1 Number of Containers to be Selected

(*Clause* B-2.2)

Sl. No.	*Lot Size* *(N)*	*No. of Containers to be Selected* *(n)*
(1)	(2)	(3)
i)	50 to 500	10
ii)	501 to 1 000	15
iii)	Above 1 000	20

F-2.4 These containers shall be chosen at random from the lot. In order to ensure the randomness of selection, random number table as agreed to between the purchaser and the supplier shall be used. In case such a table is not available, the following procedure shall be adopted:

F-2.4.1 Arrange all the containers in the lot in a systematic manner and starting from any container, count them as 1, 2, 3,……, up to r and so on where r is the integral part of *N/n* (*N* being the total number of containers in the lot and *n* the number of containers to be selected). Every r^{th} container thus counted shall be withdrawn from the lot to give a sample for test.'

F-3 PREPARATION OF COMPOSITE SAMPLE

F-3.1 Shake well each of the containers selected as in **B-2.4**. Pour out a quantity of material such that the total quantity obtained from all the containers provides material sufficient for all the tests (about 500 g or 500 ml). Thoroughly mix the material drawn from all the selected containers so as to form the composite sample. Divide this composite sample into three parts, each sufficient from carrying out the intended tests and transfer them to thoroughly cleaned and dry sample containers. Send one each to the purchaser and the supplier and the third as referee sample bearing the seals of the purchaser and the supplier. Keep the referee sample at a place agreed to between the purchaser and the supplier.

F-4 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

F-4.1 Tests for all the characteristics specified in 2 shall be done on the composite sample.

F-4.2 The lot shall be declared as conforming to this standard if the test results satisfy the corresponding requirements.