Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”


“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartrhari—Nitisatakam
“Knowledge is such a treasure which cannot be stolen”
Indian Standard

SPECIFICATION FOR
GLAZED FIRE-CLAY SANITARY APPLIANCES

PART I  GENERAL REQUIREMENTS

(Second Revision)

Third Reprint JULY 1998
(Incorporating Amendment No. 1)

UDC 696.14:666.647

Copyright 1984

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 4 September 1979
Indian Standard

SPECIFICATION FOR
GLAZED FIRE-CLAY SANITARY APPLIANCES

PART I GENERAL REQUIREMENTS

(Second Revision)

Sanitary Appliances and Water Fittings Sectional Committee, BDC 3

Chairman
Shri V. D. Desai

Representing
Bombay Municipal Corporation

Members

Adviser
Shri B. B. Roy (Alternate)
Shri H. R. Badnal
Shri K. D. Biswas (Alternate)
Shri M. K. Basu
Shri D. S. Chabhal
Shri T. Ramasubramanian (Alternate)
Shri S. P. Chakrabarti
Shri S. K. Sharma (Alternate)
Shri K. Ramachandran (Alternate)
Chief Engineer

Central Public Health & Environmental Engineering Organization (Ministry of Works & Housing)
Indian Iron & Steel Co Ltd, Calcutta
Central Glass & Ceramic Research Institute (CSIR), Ahmadabad
Directorate General of Technical Development, New Delhi
Central Building Research Institute (CSIR), Roorkee
Public Health Engineering Department, Government of Kerala, Trivandrum
Tamil Nadu Water Supply & Drainage Board, Madras
U. P. Jal Nigam, Lucknow
Municipal Corporation of Delhi, Delhi
Public Health Engineering Department, Government of Haryana, Chandigarh

(Continued on page 2)

© Copyright 1984

BUREAU OF INDIAN STANDARDS

This publication is protected under the Indian Copyright Act (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.
IS : 771 ( Part I ) - 1979

Members

<table>
<thead>
<tr>
<th>City Engineer</th>
<th>Representing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bombay Municipal Corporation</td>
</tr>
<tr>
<td>Hydraulic Engineer (Alternate)</td>
<td></td>
</tr>
<tr>
<td>Shri H. N. Dallas</td>
<td>Indian Institute of Architects, Bombay</td>
</tr>
<tr>
<td>Lala G. C. Das</td>
<td>National Test House, Calcutta</td>
</tr>
<tr>
<td>Shri T. R. De</td>
<td>Institution of Engineers (India), Calcutta</td>
</tr>
<tr>
<td>Director</td>
<td></td>
</tr>
<tr>
<td>Shri A. M. Kembhavi (Alternate)</td>
<td>Bombay Potteries &amp; Tiles Ltd, Bombay</td>
</tr>
<tr>
<td>Shri B. R. N. Gupte</td>
<td></td>
</tr>
<tr>
<td>Shri K. V. Krishnamurthy (Alternate)</td>
<td>Engineer-in-Chief's Branch (Army Headquarters)</td>
</tr>
<tr>
<td>Shri M. T. Kanse</td>
<td>Directorate General of Supplies &amp; Disposals, New Delhi</td>
</tr>
<tr>
<td>Shri S. R. Kshirsagar</td>
<td></td>
</tr>
<tr>
<td>Shri R. C. Reddy (Alternate)</td>
<td>National Environmental Engineering Research Institute (CSIR), Nagpur</td>
</tr>
<tr>
<td>Shri K. Lakshminarayanan</td>
<td></td>
</tr>
<tr>
<td>Shri A. Shariff (Alternate)</td>
<td></td>
</tr>
<tr>
<td>Shri P. S. Rajvanshi</td>
<td></td>
</tr>
<tr>
<td>Shri Ranjit Singh</td>
<td></td>
</tr>
<tr>
<td>Dr A. V. R. Rao</td>
<td></td>
</tr>
<tr>
<td>Shri P. Jagannath Rao</td>
<td></td>
</tr>
<tr>
<td>Shri M. Moosa Sulaiman (Alternate)</td>
<td>Hindustan Sanitaryware &amp; Industries Ltd, Bahadurgarh</td>
</tr>
<tr>
<td>Shri R. K. Somany</td>
<td></td>
</tr>
<tr>
<td>Superintending Surveyor of Works (NDZ)</td>
<td>Central Public Works Department, New Delhi</td>
</tr>
<tr>
<td>Surveyor of Works I (NDZ) (Alternate)</td>
<td></td>
</tr>
<tr>
<td>Shri D. Ajitha Simha, Director (Civ Engg)</td>
<td>Director General, ISI (Ex-officio Member)</td>
</tr>
</tbody>
</table>

Secretary

Shri S. P. Maggu
Assistant Director (Civ Engg), ISI

Domestic Sanitary Appliances and Accessories Subcommittee,
BDC 3:1

Convenor
Shri G. F. Khambhatti
Bombay Municipal Corporation

Members

<table>
<thead>
<tr>
<th></th>
<th>Representing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shri M. C. Agrawal</td>
<td></td>
</tr>
<tr>
<td>Shri N. L. Birla (Alternate)</td>
<td>Indian Plastics Ltd, Bombay</td>
</tr>
<tr>
<td>Assistant Director, Standards (Architecture) (RDSO)</td>
<td>Ministry of Railways</td>
</tr>
<tr>
<td>Shri M. K. Basu</td>
<td>Central Glass &amp; Ceramic Research Institute (CSIR), Ahmadabad</td>
</tr>
<tr>
<td>Shri G. T. Bride</td>
<td>National Buildings Organization, New Delhi</td>
</tr>
<tr>
<td>Shri O. P. Ratna (Alternate)</td>
<td></td>
</tr>
</tbody>
</table>

(Continued on page 16)
Indian Standard

SPECIFICATION FOR
GLAZED FIRE-CLAY SANITARY APPLIANCES

PART I GENERAL REQUIREMENTS

(Second Revision)

0. FOREWORD

0.1 This Indian Standard (Part I) (Second Revision) was adopted by the Indian Standards Institution on 4 May 1979, after the draft finalized by the Sanitary Appliances and Water Fittings Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 This standard was first issued in 1958 and was revised in 1963 to cover requirements for additional glazed earthenware sanitary appliances, such as orissa pan, laboratory sink, squatting plate, slab and stall urinal and half-round channel. In this revision the scope of the standard has been restricted to cover requirements for glazed fire-clay sanitary appliances only since the glazed earthenware sanitary appliances were outdated as well as unhygienic. The Sectional Committee has found that only some of the sanitary appliances were being made in glazed fire-clay and therefore decided to cover the requirements for these appliances only in this revision. The general requirements applicable to all appliances and specific requirements for different appliances have been covered in separate parts of the standard. This standard (Part I) deals with the general requirements of all glazed fire-clay sanitary appliances.

0.3 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 : 2·1960*. 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 (Part I) covers the general requirements for materials, manufacture, finish, methods of test, sampling and inspection of all glazed fire-clay sanitary appliances.

*Rules for rounding off numerical values (revised).
1.2 This standard does not cover vitreous sanitary appliances. Requirements of vitreous sanitary appliances have been covered in IS: 2556 (Part I)-1974*.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 BlistE — A raised portion of the surface protruding not more than one millimetre above the surface and not greater than 3 mm in its maximum dimensions.

2.2 Bubble — A raised portion of the surface or a sand speck not more than one millimetre in its maximum dimensions.

2.3 Craze or crazing — Fine hair-line cracks in the glaze.

2.4 Dull or egg shell finish — Dead or flat finish with undeveloped glaze: slightly matted in appearance or a semi-glazed finish exhibiting numerous very fine pinholes and non-glossy appearance.

2.5 Dent — A hair-line fracture extending through or into the body of the article.

2.6 Exposed body — Unglazed portion 1·5 mm or more in its maximum dimension.

2.7 Firecheck or Fire-crack — A fine, shallow crack in the body, not covered with glaze.

2.8 Kiln support marks — Large unglazed surfaces resulting from blocks necessary to support the ware while firing.

2.9 Pinhole — Unglazed portion or a hole in the body less than 1·5 mm in its maximum dimension.

2.10 Polishing mark — A spot where some minor blemish has been ground off and surface polished, the area of the spot not exceeding the area of a 10 mm diameter circle.

2.11 Pottery square — A square of dimensions 50 × 50 mm selected on the appliances for examining visual defects.

2.12 Speck — An area of contrasting colour less than one millimetre maximum dimensions. Specks less than 0·25 mm, maximum dimension, do not constitute a defect unless sufficient in number to form a discolouration.

*Specification for vitreous sanitary appliances (vitreous china): Part I General requirements (second revision).
2.13 **Spot** — A discoloured portion of the surface not exceeding 3 mm in its maximum dimension.

2.14 **Warpage** — Distortion of original shape during the manufacturing process.

2.15 **Wavy Finish** — A defect in the glaze finish having the appearance of numerous runs in the glaze, irregular or mettled.

3. **MATERIAL, MANUFACTURE AND FINISH**

3.1 **Material and Manufacture** — Fire-clay bodies are moderately fine, porous, off-white bodies using natural fire clays, ball clays or stoneware clays and clay grogs covered by a glaze properly matured and fitted to the body.

3.2 **Permissible Blemishes and Defects**

   3.2.1 When examined from any point within the viewing circle described below, the appliances shall not show to the unaided eye of a trained observer blemishes or defects in excess of those listed in Table 1.

   3.2.1.1 The viewing circle referred to is 1200 mm in diameter and lies on a plane parallel with and 600 mm above the rim of the appliances. A line joining the centre of the circle and the centre of area of the inside boundary of the rim is perpendicular to the plane of the viewing circle.

4. **MINIMUM THICKNESS**

4.1 The thickness at any place in an appliance shall not be less than 8 mm.

5. **GLAZING**

5.1 All visible surfaces of the body shall be glazed. Surfaces coming in contact with floor or wall and the underside of sinks, etc, and points where appliances are supported in the kiln may be unglazed.

5.2 The glaze shall be uniform, free from craze and shall possess an impervious surface. It shall have a high gloss and shall normally be white but may be supplied in any other colour as agreed to between the manufacturer and the purchaser. In the case of glazes containing lead, the lead content shall not exceed 5 percent of soluble lead when tested by the method described under 5.2.1.

   5.2.1 A quantity of material (glaze) of known mass dried at 100°C shall be shaken continuously for one hour (at room temperature) with 1 000 times its mass of dilute hydrochloric acid. Thereafter, it shall be allowed to stand for one hour and then filtered. The lead salt contained in the clear filtrate shall be precipitated as lead sulphate.
The mass of lead sulphate calculated as lead monoxide shall not exceed 5 percent of the dry mass of the sample taken for the test.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Location</th>
<th>Blemish or Defect</th>
<th>Maximum Permitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>i) General</td>
<td>Warpage</td>
<td>Spots and blisters</td>
<td>A total of not over six</td>
</tr>
<tr>
<td>ii) Service space, top of rim or slab, inside of bowl</td>
<td>Bubbles, pinholes and specks</td>
<td>A total of not over eight</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Polishing marks and exposed bodies</td>
<td>A total of not over four</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spots and blisters</td>
<td>A total of not over six</td>
</tr>
<tr>
<td>iii) Visible surfaces other than above</td>
<td>Bubbles, pinholes and specks</td>
<td>Not over three in one pottery square; a total of not over ten</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Polishing marks and exposed bodies</td>
<td>A total of not over four</td>
</tr>
</tbody>
</table>

6. PERFORMANCE REQUIREMENTS

6.1 Warpage — The appliance shall be considered to be within the warpage limits, if a feeler gauge of thickness equal to the maximum warpage specified (see Table 1) does not slide under the appliance without application of force.

6.2 Crazing — When tested in accordance with the procedure given in 8.2 none of the test pieces shall show crazing.

6.3 Water Absorption — The value of water absorption of any of the test pieces, when evaluated as given in 8.3 shall not exceed 15 percent.

6.4 Thermal Shock — When tested in accordance with the procedure given in 8.4 the appliance shall not show any sign of injury.
6.5 **Chemical Resistance** — When tested by the method described in Appendix A, none of the test pieces shall appear to the unaided eye of a trained observer to have suffered any loss of reflectivity of the glaze when compared with the control sample.

6.6 **Modulus of Rupture** — The average modulus of rupture of ten samples when tested by the method described in 8.6 shall not be less than 20 MPa.

6.6.1 Values taken for determination of the mean value shall not vary more than ± 20 percent of the mean value. Values above or below 20 percent of the mean may be discarded for the calculation of the mean value. If the fractured surface of test pieces show lamination crack or a cavity at the centre or any other defect, those test pieces shall be rejected.

6.7 **Resistance to Staining and Burning** — When tested by the method described in Appendix B no stain shall remain on either of the test pieces.

7. **PROCESS INSPECTION AND LOT INSPECTION**

7.1 The recommended methods for process inspection and lot inspection are given in Appendix C.

8. **TEST PROCEDURES**

8.1 **Warpage** — The appliance shall be placed face down on a flat surface preferably a surface plate to ascertain the amount of deviation from the horizontal that exists at the edges of the appliance. If the appliance rocks on two points, a horizontal plane shall be determined by placing the feeler gauge of a thickness equal to the maximum warpage permitted for the appliance (see Table 1) under one low corner and forcing the appliance down on this gauge. If a second feeler gauge of the same thickness does not slide at any other point, the appliance shall be considered as not warped out of the horizontal plane and to be in conformity with the permissible warpage limits.

8.2 **Crassing** — Three test pieces each having an area of not less than 100 cm² on one side shall be broken from widely separated parts of the article. At least one major surface shall be glazed surface. Care shall be taken not to produce cracks either in the body or in glaze; any such pieces shall be discarded. Surfaces other than major surfaces shall be unglazed and freshly broken. Alternatively, sample pieces having the same surface area as mentioned above may be separately prepared, using the same body and glaze materials used in making the appliances of the batch and put through the kiln along with the appliances.
8.2.1 Test Procedures — The sample pieces shall be placed in an autoclave and subjected to a constant pressure of 0.35 MPa in saturated steam for 5 hours. The test pieces shall then be allowed to cool to room temperature inside the autoclave. They shall then be examined for crazing by applying a dye solution to the surface.

8.3 Water Absorption Test

8.3.1 The test samples shall consist of three fragments taken from widely separated parts of the appliance, each fragment having at least one of the two major surfaces fully glazed and having a surface area of approximately 75 cm². Surfaces other than major surfaces shall be unglazed and freshly broken, care shall be taken not to produce cracks either in the body or in the glaze, any such pieces shall be discarded. Alternatively, test pieces of the same surface area and 10 mm minimum thickness with one major surface glazed shall be separately made using the same batch and glaze material as used in making of the appliances of the batch and put through the kiln along with the appliances.

8.3.2 Test Procedure — The test piece shall be dried to a constant mass at 110 ± 5°C and shall then be stored in a desiccator until cooled to room temperature. The specimen shall then be weighed in a balance to an accuracy of 0.5 g. The weighed pieces shall then be placed in distilled water in a suitable vessel and boiled for two hours. They shall be supported so as not to touch the heated bottom of the container. The pieces shall then be allowed to cool and remain in water overnight. The test pieces shall be wiped dry with a damp cloth in such a manner as to remove the surface water only and then weighed.

8.3.3 Evaluation of Test Pieces — Water absorption of the test pieces shall be calculated as follows:

\[
\text{Percentage of water absorption} = \frac{W_2 - W_1}{W_1} \times 100
\]

where

- \(W_2\) = mass of test piece after treatment, and
- \(W_1\) = mass of the dry piece.

8.4 Thermal Shock — This test shall be applicable only to kitchen sinks and laboratory sinks.

8.4.1 Test Procedures — The appliance shall be filled with hot water at 90°C and the water kept for 20 to 30 minutes depending on the dimension until the appliance gets heated throughout, after which the hot water shall be quickly emptied from the appliance and the appliance immediately filled with cold water of temperature 3°C. The cold water
shall be kept in the appliance for 20 to 30 minutes until the appliance gets thoroughly cooled, after which the cold water shall be quickly emptied from the appliance and the cycle repeated. After the repetition of the cycle for 5 times, the appliance shall not show any sign of injury.

8.5 **Tests for Chemical Resistance** — The test procedure for chemical resistance is given in Appendix A.

8.6 **Modulus of Rupture**

8.6.1 **Test Pieces** — Sample test bars shall be separately prepared, using the same body materials as used in making the appliances of a batch and shall be fired in the same kiln along with the appliances. They shall be square or circular in section and the cross-sectional area shall not be less than 150 mm² and 150 mm long and shall not be glazed.

8.6.2 **Test Procedures** — The modulus of rupture shall be determined by using at least 10 of these bars mounted on supports 125 mm apart, and loaded rapidly (approximately 50 N per second) at the mid point.

8.6.3 **Evaluation of Results** — The modulus of rupture shall be calculated from the formula:

\[ S = \frac{1.5 \, P \, L}{b \, d^2} \text{ for square sections} \]

\[ = \frac{8 \, P \, L}{\pi \, D^4} \text{ for circular sections} \]

where

- \( S \) = modulus of rupture,
- \( P \) = total load in N,
- \( L \) = length of span in mm,
- \( b \) = width of test bar to the nearest 0.1 mm,
- \( d \) = depth of test bar to the nearest 0.1 mm, and
- \( D \) = diameter of test bar in mm.

8.7 **Test for Resistance to Staining and Burning** — The test procedures shall be as given in Appendix B.

9. **INSPECTION AND MANUFACTURER’S CERTIFICATE**

9.1 The appliances shall be subjected to visual inspection in good light and they shall not show any of the following defects beyond the limits laid down under terminology:

a) Dunts,

b) Craze,

c) Warp,

d) Unglazed patches,

e) Fire-cracks, and

f) Egg shell finish.
9.2 Where agreed to between the purchaser and the vendor, the purchaser or his representative shall be given all facilities for inspection of the goods at all stages of manufacture and finally prior to despatch from the manufacturer's works.

9.3 When no inspection of the goods is made by the purchaser or his representative at the manufacturer's works, the manufacturer, if requested to do so, shall supply a certificate stating that the goods supplied conform in all respects to this standard. The manufacturer's certificate will not be necessary if the article bears the ISI Certification Mark.

9.4 The purchaser shall be at liberty to reject any goods purporting to have been supplied to this standard, if they do not comply with the requirements of this standard.

10. MARKING

10.1 Appliances shall be clearly and indelibly marked at a prominent place, visible even after the appliances are installed, with the name or trade-mark of the manufacturer.

10.1.1 The fire clay sanitary appliances conforming to the specific requirements as prescribed in the relevant parts of this standard may also be marked with the ISI Certification Mark.

Notes — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

APPENDIX A
(Clauses 6.5 and 8.5)

TEST FOR CHEMICAL RESISTANCE

A-1. CONTROL TEST PIECE SIZE

A-1.1 The test sample shall consist of 8 pieces each not smaller than 75 × 25 × 8 mm taken from the glazed part of the appliance. One piece placed in a desiccator and is used as a controlled test piece.
A-2. PROCEDURE

A-2.1 The other 7 test pieces are partially immersed one each of the 7 solutions listed in Table 2 at the strength of solution for the length of time and at temperature stated; the solutions are all aqueous.

### TABLE 2 CHEMICAL SOLUTION FOR CHEMICAL RESISTANCE TEST

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Name of Chemical</th>
<th>Strength of Solution, Percent</th>
<th>Time, Hours</th>
<th>Temperature, °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>i)</td>
<td>Acetic acid</td>
<td>10</td>
<td>16</td>
<td>100</td>
</tr>
<tr>
<td>ii)</td>
<td>Citric acid</td>
<td>10</td>
<td>16</td>
<td>100</td>
</tr>
<tr>
<td>iii)</td>
<td>Detergent ( Note 1 )</td>
<td>( see Note 1 )</td>
<td>48</td>
<td>60</td>
</tr>
<tr>
<td>iv)</td>
<td>Hydrochloric acid</td>
<td>( see Note 2 )</td>
<td>48</td>
<td>25-35</td>
</tr>
<tr>
<td>v)</td>
<td>Sodium hydroxide</td>
<td>5</td>
<td>½</td>
<td>60</td>
</tr>
<tr>
<td>vi)</td>
<td>Sodium stearate</td>
<td>0·15</td>
<td>48</td>
<td>60</td>
</tr>
<tr>
<td>vii)</td>
<td>Sulphuric acid</td>
<td>3</td>
<td>16</td>
<td>100</td>
</tr>
</tbody>
</table>

**Note 1** — This consists of an aqueous solution containing 0·04 percent (mass/vol) of a condensation product of nonyphenol with 8·10 molecules of ethylene oxide.

**Note 2** — This solution consists of equal volumes of water and of hydrochloric acid of specific gravity 1·18.

### APPENDIX B

( Clauses 6.7 and 8.7 )

TEST FOR RESISTANCE TO STAINING AND BURNING

**B-1. TEST PIECE SIZE**

**B-1.1** The test sample shall consist of two pieces each not smaller than 75 x 25 x 8 mm taken from the glazed part of the appliance.

**B-2. PROCEDURE**

**B-2.1** One of the test pieces is placed, at room temperature, with a glazed surface level uppermost, clean and dry. One spot not less than 10 mm of each of the six chemicals listed in **B-2.2** is then placed on the glazed surface and allowed to dry. Any residue is then removed with a clean cloth which has been moistened with water only.
Each individual appliance
Two pieces of each type of pattern from a day's production in case of a continuous kiln and from each firing in case of an intermittent kiln.

B-2.2 The chemicals are the following:

a) 0.5 percent solution of methylene blue,
b) 10 percent aqueous solutions of sodium hypochlorite,
c) 3 percent aqueous solutions of hydrogen peroxide,
d) Amyl acetate,
e) Carbon tetrachloride, and
f) 13 g of iodine in one litre of ethyl alcohol.

B-2.3 The other piece is placed at room temperature with a glazed surface level uppermost, clean and dry. Lighted cigarette is placed on the glazed surface and allowed to remain for 15 minutes and then removed. The stained area is wiped with a cloth which has been moistened with distilled water only.

APPENDIX C

(Clause 7.1)

PROCESS INSPECTION AND LOT INSPECTION

C-1. PROCESS INSPECTION

C-1.1 The inspection done by the manufacturer during production is to ensure uniformity and reduce quality fluctuations to the minimum whereas the object of inspecting sanitary appliances by the purchaser is to ensure its uniformity to the specification requirements. For process control the manufacturer shall take the representative samples of the product at regular intervals to control the quality fluctuations. For items of the same type, inspection levels given below are recommended for routine control over the manufacturing process:

<table>
<thead>
<tr>
<th>Characteristics/Tests</th>
<th>Frequency of Inspection/Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual examination (permissible blemishes and defects)</td>
<td>Each individual appliance</td>
</tr>
<tr>
<td>Warpage</td>
<td>Each individual appliance</td>
</tr>
<tr>
<td>Minimum thickness</td>
<td>Two pieces of each type of pattern from a day’s production in case of a continuous kiln and from each firing in case of an intermittent kiln</td>
</tr>
<tr>
<td>Characteristics/Tests</td>
<td>Frequency of Inspection/Tests</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Dimensions of appliance</td>
<td>Two pieces of each type of pattern from a week's production in case of a continuous kiln and from each firing in case of an intermittent kiln</td>
</tr>
<tr>
<td>Construction</td>
<td>Each individual appliance</td>
</tr>
<tr>
<td>Water absorption</td>
<td>Three sample pieces every day in case of a continuous kiln and from every firing in case of an intermittent kiln</td>
</tr>
<tr>
<td>Crazing</td>
<td>Three sample pieces twice a week in case of a continuous kiln and from every firing in case of an intermittent kiln</td>
</tr>
<tr>
<td>Test for chemical resistance</td>
<td>Eight sample test pieces once a week in case of a continuous kiln and from every firing in case of an intermittent kiln</td>
</tr>
<tr>
<td>Test for staining and burning</td>
<td>Two sample pieces once a week in case of a continuous kiln and from every firing in case of an intermittent kiln</td>
</tr>
<tr>
<td>Test for modulus of rupture</td>
<td>Ten sample pieces twice a week in case of a continuous kiln and twenty sample pieces from every firing in case of an intermittent kiln</td>
</tr>
<tr>
<td>Test for thermal shock</td>
<td>Two sample pieces once a week in case of a continuous kiln and from every firing in case of an intermittent kiln</td>
</tr>
</tbody>
</table>

C-1.2 For effective process control, the use of statistical quality control techniques is recommended and helpful guidance may be obtained in this respect from IS : 397-1972*.

C-1.3 The inspection data or the results of tests done at the place of manufacturer may be made available along with the items supplied to enable the purchaser to judge the acceptability of the lot.

*Method of statistical quality control during production.
C-1.4 When such information cannot be made available to the purchaser and when the purchaser so desires, the procedure laid down in C-2 shall be followed for judging the conformity of the lot to the requirements of this standard.

C-2. LOT INSPECTION

C-2.1 In any consignment all the appliances of the same type and size shall be grouped to 200 pieces or less. Each such group shall constitute a lot.

C-2.1.1 Samples shall be taken from each lot separately to ascertain the conformity of the appliances to the requirements of the specification.

C-2.2 Number of Tests and Criteria for Conformity of Crazing, Water Absorption, Chemical Resistance, and Resistance to Staining and Burning — The number of tests to be made and the criteria to ascertain conformity or otherwise of lot to the requirements of these tests shall be as given in the relevant test method.

C-2.3 Number of Tests and Criteria for Conformity for Finish, Thickness, Dimensions, Construction Glazing and Warpage — The number of appliances to be selected shall depend upon the size of the lot and shall be in accordance with col 3 and 4 of Table 3.

C-2.4 The appliances shall be selected at random from the lot and in order to ensure the randomness of selection, random number tables may be used. In case random number tables are not available the following procedure shall be adopted:

'Starting from any appliance in the lot count them as 1,2,3,......, up to \( r \) and so on, in one order, where \( r \) is the integral part of \( N/n \) ( \( N \) being the lot size and \( n \) being the sample size). Every \( r \)th appliance thus counted shall be withdrawn to constitute a sample.'

C-2.5 Each of the appliances selected in the sample shall be inspected for finish, thickness (see Note under Table 3) dimensions, construction glazing and warpage. Any appliance failing to meet any one or more requirements of the above characteristics shall be considered as defective.

C-2.6 If the number of defective appliances found is less than or equal to the corresponding permissible number given in col 3 of Table 3, the lot shall be considered as conforming to the requirements of the above characteristics, otherwise not.
TABLE 3 SCALE OF SAMPLING AND PERMISSIBLE NUMBER OF DEFECTIVES
(Clauses C-2.3, C-2.5 and C-2.6)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Characteristics</th>
<th>No. of Appliances in the Lot</th>
<th>No. of Appliances to be Selected</th>
<th>Permissible No. of Defective</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td></td>
<td></td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>i)</td>
<td>For finish, glazing and warpage</td>
<td>2 to 8</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 to 15</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16 to 25</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26 to 50</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>51 to 100</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>101 and above</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>ii)</td>
<td>For minimum thickness, dimensions and construction</td>
<td>Up to 25</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26 to 50</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>51 to 100</td>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>101 and above</td>
<td>32</td>
<td>5</td>
</tr>
</tbody>
</table>

Note — Special calipers can be used for measuring thickness without having to break the appliance for checking the minimum thickness.
IS : 771 ( Part I ) - 1979

( Continued from page 2 )

<table>
<thead>
<tr>
<th>Members</th>
<th>Representing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shri S. P. Chakrabarti</td>
<td>Central Building Research Institute (CSIR), Roorkee</td>
</tr>
<tr>
<td>Chief Engineer</td>
<td>Tamil Nadu Water Supply &amp; Drainage Board, Madras</td>
</tr>
<tr>
<td>Chief Engineer ( Water )</td>
<td>Municipal Corporation of Delhi</td>
</tr>
<tr>
<td>Additional Chief Engineer ( Water ) ( Alternate )</td>
<td></td>
</tr>
<tr>
<td>City Engineer</td>
<td>Bombay Municipal Corporation</td>
</tr>
<tr>
<td>Director</td>
<td>Bombay Potteries &amp; Tiles Ltd, Bombay</td>
</tr>
<tr>
<td>Shri A. M. Kembhavi ( Alternate )</td>
<td>Parshuram Pottery Works Co Ltd, Thangadh</td>
</tr>
<tr>
<td>Shri M. K. Ganpule</td>
<td></td>
</tr>
<tr>
<td>Shri R. M. Joshi ( Alternate )</td>
<td>Ministry of Defence</td>
</tr>
<tr>
<td>Shri B. R. N. Gupta</td>
<td></td>
</tr>
<tr>
<td>Shri K. V. Krishnamurthy ( Alternate )</td>
<td>Directorate General of Supplies &amp; Disposals, New Delhi</td>
</tr>
<tr>
<td>Shri M. T. Kanse</td>
<td></td>
</tr>
<tr>
<td>Shri B. K. Malhan</td>
<td>In personal capacity (9 Jain Mandir Road, New Delhi)</td>
</tr>
<tr>
<td>Shri B. S. Mirchandani</td>
<td>Phenoweld Polymer Private Limited, Bombay</td>
</tr>
<tr>
<td>Shri A. S. Mirchandani ( Alternate )</td>
<td></td>
</tr>
<tr>
<td>Shri D. Appukuttan Nair</td>
<td>Public Health Engineering Department, Government of Kerala</td>
</tr>
<tr>
<td>Shri K. Ramachandran ( Alternate )</td>
<td>Neiveli Ceramics &amp; Refractories Limited, Vadalur</td>
</tr>
<tr>
<td>Shri B. J. Pentony</td>
<td></td>
</tr>
<tr>
<td>Shri Umastosh Sarkar ( Alternate )</td>
<td>E. I. D.-Parry Ltd, Madras</td>
</tr>
<tr>
<td>Shri P. Jaganath Rao</td>
<td></td>
</tr>
<tr>
<td>Shri M. Moosa Sulaiman ( Alternate )</td>
<td></td>
</tr>
<tr>
<td>Shri L. R. Sehgal</td>
<td>L. R. Schgal &amp; Company, New Delhi</td>
</tr>
<tr>
<td>Shri Amal Kumar Sen</td>
<td>Bengal Enamel Works Ltd, Calcutta</td>
</tr>
<tr>
<td>Shri R. K. Somany</td>
<td>Hindustan Sanitaryware &amp; Industries Ltd, Bahadurgarh</td>
</tr>
<tr>
<td>Surveyor of Works ( NDZ )</td>
<td>Central Public Works Department, New Delhi</td>
</tr>
<tr>
<td>Shri S. A. Tungare</td>
<td>The Indian Institute of Architects, Bombay</td>
</tr>
</tbody>
</table>
BUREAU OF INDIAN STANDARDS

Headquarters
Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002
Telephones 323 0131, 323 3375, 323 9402
Fax 91 11 3234062, 91 11 3239399, 91 11 3239382

Central Laboratory
Plot No 20/9, Site IV, Sahibabad Industrial Area Sahibabad 201010 8-77 00 32

Regional Offices:
Central Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002 323 76 17
*Eastern 1/4 CIT Scheme VII M, V I P Road, Maniktola, CALCUTTA 700054 337 86 62
Northern SCO 335-336, Sector 34-A, CHANDIGARH 160022 60 38 43
Southern CIT Campus, IV Cross Road, CHENNAI 600113 235 23 15
†Western Manakalaya, E9, Behind Marol Telephone Exchange, Andheri (East), MUMBAI 400093 832 92 95

Branch Offices:
'Pushpak', Nurmohamed Shaikh Marg, Khanpur, AHMEDABAD 380001 550 13 48
‡Peenya Industrial Area, 1st Stage, Bangalore-Tumkur Road, BANGALORE 560058 839 49 55
Gangotri Complex, 5th Floor, Bhadbhada Road, T T Nagar, BHOPAL 462003 55 40 21
Plot No 62-63, Unit VI, Ganga Nagar, BHUBANESHWAR 751001 40 36 27
Kalaikathir Buildings, 670 Avinashi Road, COIMBATORE 641037 21 01 41
Plot No 43, Sector 16 A, Mathura Road, FARIDABAD 121001 8-28 88 01
Savitri Complex, 116 G T Road, GHAZIABAD 201001 8-71 19 96
53/5 Ward No 29, R G Barua Road, 5th By-lane, GUWAHATI 781003 54 11 37
5-8-56C, L N Gupta Marg, Nampally Station Road, HYDERABAD 500001 20 10 83
E-52, Chitaranjan Marg, C-Scheme, JAIPUR 302001 37 29 25
117/418 B, Sarvodaya Nagar, KANPUR 208005 21 68 76
Seth Bhawan, 2nd Floor, Behind Leela Cinema, Naval Kishore Road, LUCKNOW 226001 23 89 23
NIT BUILDing, Second Floor, Gokulpat Market, NAGPUR 440010 52 51 71
Pattiputra Industrial Estate, PATNA 800013 26 23 05
Institution of Engineers (India) Building 1332 Shivaji Nagar, PUNE 411005 32 36 35
T C No 14/1421, University P O Palayam, THIRUVANANTHAPURAM 695034 6 21 17

*Sales Office is at 5 Chowringhee Approach, P O Princep Street, CALCUTTA 700072 27 10 85
†Sales Office is at Novelty Chambers, Grant Road, MUMBAI 400007 309 65 28
‡Sales Office is at ‘F’ Block, Unity Building Narashimaraaja Square, BANGALORE 560002 222 39 71

Printed at Prinntograph, New Delhi, Ph 520847