IS 2548-2 (1996): plastic seats and covers for water-closets, Part 2: Thermo plastic seats and covers [CED 3: Sanitary Appliances and Water Fittings]

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IS 2548 (Part 2) : 1996
( Reaffirmed 2002 )

भारतीय मानक

# शौचकुंड के लिए प्लास्टिक की पीठिका और ढक्कन — विशिष्टि

## भाग 2 ताप सुनम्य पीठिका और ढक्कन

( पांचवां पुनरीक्षण )

*Indian Standard*

# PLASTIC SEATS AND COVERS FOR WATER-CLOSETS — SPECIFICATION

## PART 2 THERMOPLASTIC SEATS AND COVERS

*( Fifth Revision )*

ICS 91.140.70; 83.140



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

*December* 1996

Price Group 7

## FOREWORD

This Indian Standard (Part 2) (Fifth Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Sanitary Appliances and Water Fittings Sectional Committee had been approved by the Civil Engineering Division Council.

This standard was first published in 1963. The first revision of the standard was issued on an emergency basis in 1966 mainly to provide immediate alternative material available indigeneously for component parts for which only non-ferrous and stainless steel had been specified earlier. The second revision was issued in 1967 after reviewing the emergency standard in the light of further experience. In the third revision in 1980, the seats and covers were classified on the basis of the type of material out of which they are moulded, namely, thermosetting and thermoplastic. Materials for hinging devices were also modified.

The Committee responsible for the fourth revision felt that the requirements for thermoset and thermoplastic seats and covers, earlier specified together, should be given in separate parts of the standard so that the Government Departments and other organized consumers, while ordering the seats and covers, could appropriately specify the IS No. with Part and could get the material of their choice. This standard (Part 2) deals with thermoplastic seats and covers while thermoset seats and covers have been dealt with in Part 1.

The Committee while preparing the fourth revision decided to include additional requirements and tests for better evaluation of the quality of the seats and covers. For thermoplastic seats and covers, dealt within this standard (Part 2), water absorption, impact resistance,rigidity, distortion, staining and surface hardness tests have been included. A clause on informative labelling has also been added.

The Committee while preparing this fifth revision decided to harmonize dimensions with IS 2556 (Part 2) : 1994 ; to review and incorporate amendments issued to date and to include endurance test for better evaluatiion of the quality of seats and covers with buffers.

For commercial and institutional use, such as hospital building and railways, where heavy and rough use of seats and covers is a common phenomenon, it is recommended that the underside of the seat should be flat with solid moulding.

In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country. This has been met by deriving assistance from BS 1254 : 1981 'Specification for WC seats (plastics)', issued by the British Standards Institution.

The compositions of the technical committee responsible for the preparation of this standard is given at Annex P.

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 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# AMENDMENT NO. 1 JUNE 2003
# TO
# IS 2548 ( PART 2 ) : 1996 PLASTIC SEATS AND COVERS FOR WATER-CLOSETS — SPECIFICATION
## PART 2 THERMOPLASTIC SEATS AND COVERS

*( Fifth Revision )*

( *Page* 4, *clause* **8.1.1** ) — Insert the following at the end of Note 1 along with new Figure 2 and renumber the subsequent figures:

'The distance shall be measured as shown in Fig. 2.'

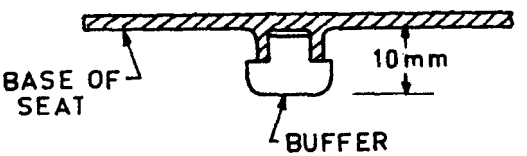


FIG. 2 POSITION OF BUFFER

( CED 3 )

Reprography Unit, BIS, New Delhi, India

# *Indian Standard*

# PLASTIC SEATS AND COVERS FOR WATER-CLOSETS — SPECIFICATION

## PART 2 THERMOPLASTIC SEATS AND COVERS

## *( Fifth Revision )*

### 1 SCOPE

This standard (Part 2) covers requirements for thermoplastic seats and covers for water-closets.

### 2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

| *IS No.* | *Title* |
|---|---|
| 867 : 1963 | Method of test for phenolic moulding materials (*revised*) |
| 1068 : 1993 | Specifications for electroplated coating of nickel plus chromium and copper plus nickel plus chromium (*third revision*) |
| 1868 : 1982 | Specification for anodic coatings on aluminium and its alloys (*second revision*) |
| 2267 : 1972 | Specification for polystyrene moulding materials (*first revision*) |
| 2556 (Part 2) : 1994 | Specification for vitreous sanitary appliances (vitreous china): Part 2 Specific requirements of wash-down water-closets (*fourth revision*) |
| 4218 (Part 6) : 1978 | ISO Metric screw threads: Part 6 Limits of sizes for commercial bolts and nuts (diameter range 1 to 52 mm) (*first revision*) |
| IS 13360 (Part3/Sec 1) : 1995 | Plastics — Methods of testing: Part 3 Physical and dimensional properties, Section 1 Determination of density and relative density of non-cellular plastics |
| IS 13360 (Part5/Sec 1) : 1996 | Plastics — Methods of testing: Part 5 Mechanical properties, Section 1 Determination of tensile properties — General principles |
| IS 13360 (Part5/Sec 2) : 1996 | Plastics — Methods of testing Part 5 Mechanical properties, Section 2 Determination of tensile properties — Test conditions for moulding and extrusions plastics |
| IS 13360 (Part5/Sec 4) : 1996 | Plastics — Methods of testing: Part 5 Mechanical properties, Section 4 Determination of Izod impact strength |

### 3 GRADES

Based on the deflection characteristics (*see* **9.4.1** and **9.4.2**) thermoplastic seats and covers have been designated as Grade 1 and Grade 2.

### 4 MATERIALS

#### 4.1 Seats and Covers

**4.1.1** Material for the manufacture of seats and covers shall be either of the following:

a) Polystyrene conforming to Type 2 or Type 3 of IS 2267 : 1972,

b) Polypropylene conforming to requirements specified in Annex A.

#### 4.2 Hinging Device

Material for hinging device shall be one of the following:

a) Bronze or brass with nickel chromium plating conforming to IS 1068 : 1993,

b) Mild steel with nickel chromium plating conforming to IS 1068 : 1993,

c) Aluminium alloy with anodic coating conforming to IS 1868 : 1982, and

d) Suitable plastic (with reinforcement)(*see* Note).

NOTE — Plastics satisfying the following requirements are considered as suitable:

a) Water absorption on immersion for 24 hours should not exceed 0.6 percent by mass;
b) Elongation should be 15 percent, *Min;* and
c) The material should be capable of withstanding temperature up to 55°C without undergoing deformation or softening and becoming unsatisfactory in performance.

## 5 MANUFACTURE

### 5.1 Shapes

#### 5.1.1 *Seat*

The underside of the seats may be either flat or recessed. Where the underside is flat, the seat shall be a solid moulding, and where the underside is recessed, the section shall be not less than 3 mm at any point. The seats may be of the closed or open front pattern (*see* Fig. 1). The design shall provide for fixing of the seat on water-closet by hinging device. The seat shall be free from warpage.

##### 5.1.1.1 *Preferred design*

The preferred design of the seat shall be such that the underside is flat.

##### 5.1.1.2 *Other permitted design*

The underside of the seat shall have as few recesses as possible. The only protuberances from the general contour of the hollowed part of the seat shall be for one or more of the following reasons:

a) To provide or reinforce part of the hinging device (*see* **7**)

b) To provide buffers (*see* **8.1.1**),

c) To provide distance pieces to elevate the seat from the water-closet rim (*see* **8.2**), and

d) For marking purposes (*see* **14**).

#### 5.1.2 *Cover*

The cover shall completely cover the aperture of the seat and shall be so designed that it is capable of being raised easily from the seat. The design shall enable it to be connected to the seat by hinging device. The cover shall be not less than 3 mm in thickness at any point. The underside of the cover shall not have any projection other than the outer rim or buffers. The cover shall be free from warpage.

### 5.2 Finish

The surfaces of the seats, covers and components shall be smooth, free from blisters and delamination and reasonably free from flowlines, contamination, streaking and unintended colour variation. They shall be capable of being easily cleaned and shall not be adversely affected by household cleaners. There shall be no sharp edges. The mouldings shall be non-absorptive and free from cracks, crevices and internal voids.

### 5.3 Colour

The seats and covers shall be supplied in colours as agreed to between the manufacturer and the purchaser.

## 6 DIMENSIONS

### 6.1 Seat

The seat shall conform to the dimensions given in Table 1 and Fig. 1. In the case of open front design, the seat, together with any reasonable extension of its outline in a plan view necessary to produce the outline plan shown in Fig. 1, shall conform to the dimensions given in Table 1.

### 6.2 Cover

The cover shall conform to the dimensions given in Table 1 and Fig. 1.

## 7 HINGING DEVICE

**7.1** The manufacturer shall supply with each seat two bolts made of any one of the materials specified for hinging device (*see* **4.2**). The bolts shall have a minimum shank length of 65 mm and a coarse thread of M8 size in accordance with IS 4218 (Part 6) : 1978 within 25 mm of the flange for fixing to the pan. Each bolt shall be provided with two suitably shaped washers of rubber or other equivalent material for adjusting the level of the seat when securing it to the pan. The maximum external measurement of any such washers fixed on the underside of the pan shall be not greater than 25 mm. In addition, one washer made of any other material specified for bolts and not exceeding 25 mm in diameter shall be provided with each bolt.

**7.1.1** Alternative hinging device of suitable design as agreed to between the manufacturer and the purchaser may also be used for fixing.

**7.1.2** Hinging pins, where used, shall be not less than 5 mm in diameter.

**7.1.3** The hinging device shall not be attached by screws inserted direct into the plastic material of the seat or cover.

## 8 BUFFERS AND DISTANCE PIECES

### 8.1 Buffers

**8.1.1** Each seat (if not provided with distance pieces) shall be provided with not less than three

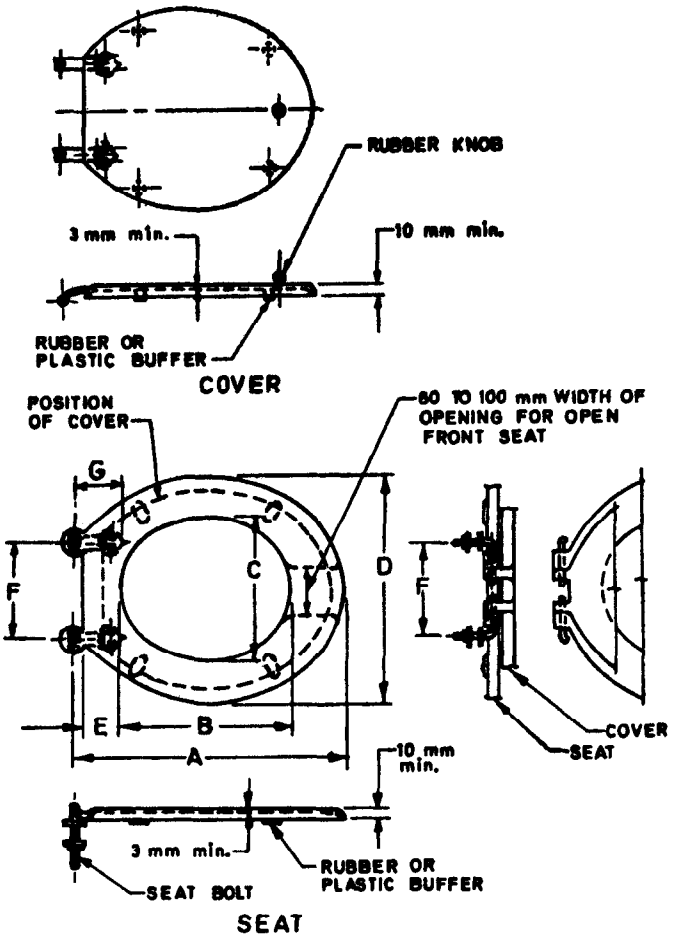


FIG. 1 PLASTIC SEAT AND COVER

**Table 1 Dimensions of Seats and Covers**
(*Clauses* 6.1 *and* 6.2 and *Fig.* 1)
All dimensions in millimetres.

| Sl No. | Description | Dimension | |
|---|---|---|---|
| | | *Min* | *Max* |
| (1) | (2) | (3) | (4) |
| i) | Distance from centre line of hinge bolts to extreme edge of rim at front, *A* | 445 | 475 |
| ii) | Length of opening at longest point, *B* | 250 | 290 |
| iii) | Width of opening at widest point, *C* | 215 | 240 |
| iv) | Overall width at widest point, *D* | 380 | — |
| v) | Distance between inner and outer rims, *E* | 55 | — |
| vi) | Centre-to-centre distance of seat bolt holes, *F* | 145 | 175 |
| vii) | Distance from centre line of hinge bolts to inner rim of seat at the back, *G* | 85 | — |
| viii) | Thickness of seat at thinnest point | 3 | — |
| ix) | Thickness of cover at thinnest point | 3 | — |

NOTE — Some hinging devices are made so as to provide adjustment in the longitudinal direction. This is not precluded by these figures.

rubber or plastic buffers of size 25 mm × 40 mm × 10 mm for closed front seats and not less than 4 for open front seats, which shall be securely fixed to the underside of the seat.

NOTES

1 The dimension '10 mm' refers to the clear projection from the base.

2 Buffer size specified above is the minimum size. Buffers larger than the size specified shall be permitted with a provision that they do not protrude beyond the seat.

**8.1.1.1** The buffers shall be so located that the seat is properly supported by the top surface of the water-closet. Metal fastenings of the buffers, where used, shall be so recessed that they do not come in contact with the rim of the water-closet.

### 8.2 Distance Pieces

If the seat is not provided with buffers as specified in **8.1.1**, it shall have four radial ribs, known as distance pieces, moulded integrally with it to raise it not less than 3 mm from the upper surface, of the rim of the water-closet. The rib shall be not less than 45 mm in the radial direction, but not less than 3 mm wide on plan. The distanct between two adjacent ribs shall be not less than 100 mm.

**8.2.1** Each cover shall be fitted with the same number of buffers as provided for the seat (*see* **8.1.1**). The buffers below the seat and cover shall be placed vertically over each other.

**8.2.2** Alternatively the seat and cover may not be provided with buffers or distance pieces. In that case the design of seat shall be such that underside contact surface is flat and covers the whole rim of water-closet pan and is stable.

## 9 TEST REQUIREMENTS

### 9.1 Strength

The seats shall withstand, without permanent distortion of the seat or the hinge fittings or damage to any finish, a load of 1 150 *N* applied in the manner prescribed in Annex B for a period of 30 minutes.

### 9.2 Water Absorption

When tested according to Annex C, the increase in mass shall be 0.75 percent, *Max* and on visual inspection after immersion, it shall show no impairment in respect of the characteristics specified under **5.2**.

### 9.3 Impact Resistance

**9.3.1** *Seats*

When tested in accordance with Annex D, the seat, hinges and buffers/distance pieces shall show no visible damage.

**9.3.2** *Covers*

When tested in accordance with Annex E, the cover, cover hinges and cover buffers shall show no visible damage.

### 9.4 Rigidity

**9.4.1** *Seats*

When tested in accordance with Annex F, the maximum deflection shall be as given below and on visual inspection after the load is removed, the seats shall not show any fracture:

| *Grade* | *Deflection*, mm |
|---|---|
| 1 | 12.5 |
| 2 | 20.0 |

**9.4.2** *Covers*

When tested in accordance with Annex G, the maximum deflection shall be as given below and on visual inspection after the load is removed, the cover shall not show any fracture and no part of the edge of the cover shall be pushed through the seat opening:

| *Grade* | *Deflection*, mm |
|---|---|
| 1 | 25 |
| 2 | 40 |

**9.4.3** When tested in accordance with Annex H, the maximum distortion shall be 3 mm.

### 9.5 Staining by Seats and Covers

When tested in accordance with Annex J, there shall not be any visible colour transfer to the white cloth.

### 9.6 Staining and/or Other Surface Deterioration of Seats and Covers

When tested in accordance with Annex K, there shall not be any change of colour or other adverse change in surface characteristics.

### 9.7 Surface Hardness

When tested in accordance with Annex L, a minimum value of Rockwell Hardness Number (HR) shall be 'L45'.

### 9.8 Endurance Test for Seats, Covers and Buffers

When tested in accordance with Annex M neither seat, cover or buffer should be damaged or dislocated. This is a type test to be done once in six months.

## 10 SUPPLY CONDITIONS

**10.1** While ordering or supplying, the purchaser and the supplier/manufacturer shall clearly identify in the order or in the supply document, the type of the seats and covers to be supplied/being supplied

(*see* **3.1**) along with the material of the hinging device.

**10.2** In addition to that given in **10.1**, while making an enquiry of placing an order, the purchaser shall provide the following information:

a) The required colour (*see* **5.3**), and

b) Whether the prefered design is required for seats (*see* **5.1.1.1**).

## 11 INSPECTION

The purchaser or his representative, where agreed to between the supplier/manufacturer and the purchaser, shall be granted facilities for the purpose of inspection of the finished goods prior to delivery.

## 12 REJECTION

The purchaser shall have the option of rejecting any article purporting to be supplied to this standard if it fails to meet any of the requirements laid down in this standard.

## 13 SAMPLING

The method of drawing representative samples of the material and the criteria for conformity shall be as prescribed in Annex N.

## 14 MARKING

Each seat and cover manufactured in accordance with this standard shall be clearly and indelibly marked with the name or identification mark of the manufacturer and grade (*see* **3.1**). This marking shall be on the underside of the seats and covers and shall be capable of being seen even after these are installed. The material used for hinging device shall be indicated in the label/packing slip attached to the seats and covers.

### 14.2 Informative Labelling

**14.2.1** Informative labelling may be provided for each seat and cover assembly.

**14.2.2** Each seat and cover assembly shall be supplied with a self-adhesive label which shall commence with the following notice prominently displayed:

NOTICE TO BUILDER: PLEASE LEAVE THIS LABEL IN POSITION FOR THE USER TO READ.

**14.2.3** The label shall contain the following information:

a) Which cleanser may be used on the seat and cover,

b) Which polishes may be used on the seat and cover, and

c) The manner in which the cleansers and polishes should be used.

**14.2.3.1** The label shall also state the following:

'Avoid abrasives and scouring powder for cleaning and, in particular, avoid cleansers used to clean the water-closet'.

'Lighted cigarettes should not be placed on the seat or cover'

### 14.3 BIS Certification Marking

Each seat and cover may also be marked with the Standard Mark.

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

# ANNEX A

(*Clause* 4.1.1)

## REQUIREMENTS FOR POLYPROPYLENE

**A-1 DENSITY**

The density of the material as determined by the method given in IS 13360 (Part 3/Sec 1) : 1995 shall be between 0.900 to 0.910 g/ml.

**A-2 TENSILE STRENGTH**

The tensile strength of the material when tested in accordance with IS 13360 (Part 5/Sec 1) : 1996 with Type 1 A specimen in accordance with IS 13360 (Part 5/Sec 2) : 1996 shall not be less than 31.5 MPa.

**A-3 IMPACT STRENGTH**

The impact strength of the material when tested in accordance with IS 13360 (Part 5/Sec 4) : 1996 with Type 4 specimen with 'A' notch type shall be greater than 0.3 MPa of notch.

**A-4 WATER ABSORPTION**

The water absorption of the material, when tested according to IS 867 : 1963 shall be not more than 0.04 percent by mass.

**A-5 DEFLECTION TEMPERATURE**

The temperature of deflection under load, when tested according to IS 867 : 1963 shall be not less than 54°C.

# ANNEX B

(*Clause* 9.1)

## STRENGTH TEST FOR SEATS

**B-1 APPARATUS.**

**B-1.1** The seat is to be tested affixed to a platform by its hinges after removing the cover.

**B-1.2** The width of the platform shall allow sufficent over hang of the sides of the seat to enable the test load to be properly applied. The seat shall be provided with rubber buffers of the same type and affixed in the same manner as when in use.

**B-1.3** An arrangement for testing is shown in Fig.2. A water-closet may be used to support the seat for testing if it is raised to a sufficient height to allow proper application of the test load.

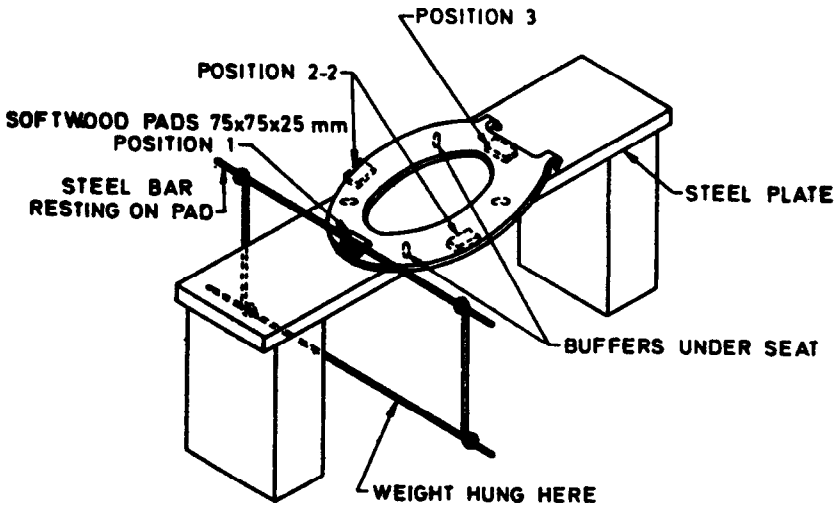


FIG. 2 ARRANGEMENT FOR STRENGTH TESTING OF SEAT

### B-2 PROCEDURE

B-2.1 Apply the test load to the top of the seat through a 75 mm square softwood pad, 25 mm thick, by suspending mass from the frame. The necessary mass shall be attached to the frame in increments of 10 kg or 20 kg.

B-2.2 Apply the load to the front of the seat (Position 1, Fig. 2); the sides of the seat (Positions 2-2, Fig. 2) and to the back of the seat between hinges (Position 3, Fig. 2) Care shall be taken in the last position to see that the pad transmits the full load to the seat and does not rest on any hinge pin.

### B-3 REPORTING

Inspect the seat, buffers and hinges and note any damage that has occurred.

## ANNEX C

*(Clause* 9.2)

### TEST FOR WATER ABSORPTION OF SEATS AND COVERS

### C-1 OBJECT

The object of the water absorption test is to ensure that the seat or cover is durable and hygienic.

### C-2 APPARATUS

C-2.1 **Balance** — to weigh the seat or cover to an accuracy of 0.1 g.

C-2.2 **Vessel** — containing enough water that the seat or cover can be submerged in it.

### C-3 PROCEDURE

All samples shall be conditioned at ambient temperature and humidity for at least 24 hours after manufacture. Weigh the seat or cover ($M_1$). Immerse the whole of the seat or cover in water for 24 hours. Remove the seat or cover from the water and immediately blot off the surface water and weigh the specimen again ($M_2$).

### C-4 REPORTING

Record the values $M_1$ and $M_2$ to the nearest 0.1 g. Calculate the percentage increase in mass, to two decimal places, from the following equation.

$$\text{Percentage increase} = \frac{100\,(M_2 - M_1)}{M_1}$$

Note any change in any surface characteristic which has occurred.

## ANNEX D

*(Clause* 9.3.1)

### TEST FOR IMPACT RESISTANCE OF SEATS

### D-1 OBJECT

The object of the impact test is to ensure:

a) that the seat is strong enough to withstand both an impact load, when in the raised position, typical of that which it might receive under normal conditions of use, and the subsequent impact load as it strikes the water-closet to which it is secured; and

b) that the hinges and buffers of the seat are robust enough to withstand the loads arising from the impacts.

### D-2 APPARATUS

D-2.1 **Water-Closet** — complying with the requirements of IS 2556 (Part 2) : 1994.

D-2.2 **Frame** — capable of supporting:

a) the seat, when it is attached to the water-closet, in a vertical position, but allowing it to fall freely when struck by a pendulum; and

b) a pendulum on a pivot and at such a height that, when released from the horizontal, it will swing downwards through an arc of 90 so that the centre of its disc strikes the raised seat centrally at the extreme point.

NOTE — A mechanical means of releasing the pendulum may be provided.

D-2.3 **Pendulum** — 380 mm long from the centre of its pivot to the centre of the striking disc, and comprising a rod of mass not exceeding 0.23 kg and a rigid 150 mm diameter disc faced with 3 mm thick rubber of hardness 55 ± 5 IRHD. The total mass of the pendulum shall be 4.1 kg.

D-2.4 The set-up of apparatus is shown in Fig. 3.

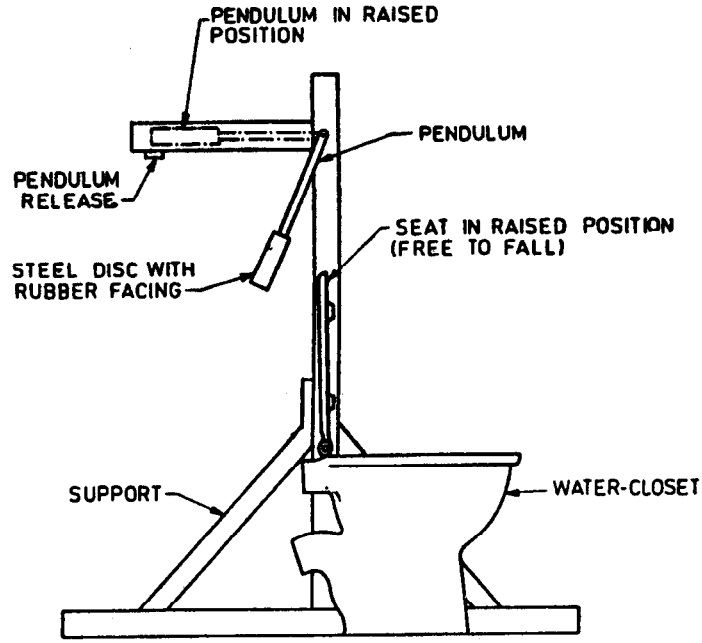


FIG. 3 ARRANGEMENT FOR TESTING IMPACT RESISTANCE OF SEATS

### D-3 PROCEDURE

Assemble the seat to the water-closet and place the assembly in the frame. Raise the seat to the vertical position and support it so that after being struck by the pendulum it is free to fall. Raise the pendulum to the horizontal and release it so that it swings downwards to strike the raised seat centrally at the extreme point.

### D-4 REPORTING

Inspect the seat, buffers and hinges and note any damage that has occurred.

## ANNEX E

*(Clause* 9.3.2)

### TEST FOR IMPACT RESISTANCE OF COVERS

### E-1 OBJECT

The object of the impact test is to ensure:

a) that the cover is strong enough to withstand both an impact load, when in the raised position, typical of that which it might receive under normal conditions of use, and the subsequent impact load as it strikes the seat to which it is secured; and

b) that hinges and buffers of the cover are robust enough to withstand the loads arising from the impacts.

### E-2 APPARATUS

**E-2.1 Water-Closet** — complying with the requirements of IS 2556 (Part 2) : 1994.

**E-2.2 Seat** — complying with the requirement of this standard.

**E-2.3 Frame** — capable of supporting:

a) the cover, when it is attached to the seat, in a vertical position, but allowing it to fall freely when struck by a pendulum; and

b) a pendulum on a pivot and at such a height that, when released from the horizontal, it will swing downwards through an arc of 90 so that the centre of its disc strikes the raised cover centrally at the extreme point.

NOTE — A mechanical means of releasing the pendulum may be provided.

**E-2.4 Pendulum** — 380 mm long from the centre of its pivot to the centre of the striking disc, and comprising a rod of mass not exceeding 0.23 kg and a rigid 150 mm diameter disc faced with 3 mm thick rubber of hardness 55 ± 5 IRHD. The total mass of the pendulum shall be 4.1 kg.

**E-2.5** The set-up of the apparatus is shown in Fig. 4.

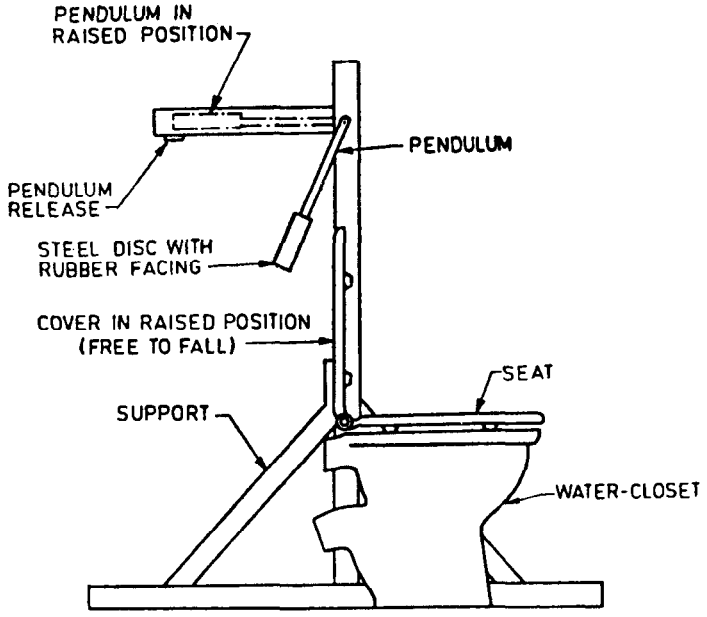


FIG. 4 ARRANGEMENT FOR TESTING IMPACT RESISTANCE OF COVERS

E-3 PROCEDURE

Assemble the seat to the water-closet, and the specimen cover to the seat. Place the assembly in the frame. Raise the cover to the vertical position and support it so that after being struck by the pendulum it is free to fall. Raise the pendulum to the horizontal and release it so that it swings downwards to strike the raised cover centrally at the extreme point.

E-4 REPORTING

Inspect the cover, buffers and hinges and note any damage that has occurred.

## ANNEX F

(*Clause* 9.4.1)

TEST FOR RIGIDITY OF SEATS

F-1 OBJECT

The object of the rigidity test is to ensure that the seat, when supported only by its hinges and with or without buffers or distance pieces, is sufficiently rigid both to support the weight of the user and to distribute that weight uniformly.

F-2 APPARATUS

F-2.1 **Firm Flat Base**

F-2.2 **Metal Supports** — Two, each 50 mm × 25 mm × 500 mm.

F-2.3 **Metal Loading Bar** — 75 mm wide, of a length greater than the width of the seat and of mass 45 kg. Alternatively a rigid bar of 75 mm width and length greater than the width of the seat with a total symmetric load of 45 kg may be used.

F-2.4 **Scale** — capable of measuring to 0.5 mm.

F-2.5 The set-up of apparatus is shown in Fig. 5.

F-3 PROCEDURE

The specimen shall be conditioned at ambient temperature and humidity for at least 24 hours after manufacture and lay it on the supports as shown in Fig. 5. Measure the height $X_1$ from the base to underside of the seat at a point mid-way between the supports to the nearest 0.5 mm. Place the loading bar on the seat as shown in Fig. 5. After 10 minutes, measure the height $X_2$ from the base to the underside of the seat at a point mid-way between the supports to the nearest 0.5 mm.

F-4 REPORTING

Calculate the deflection as $X_1 - X_2$. Inspect the seat to see if any fracture has occurred.

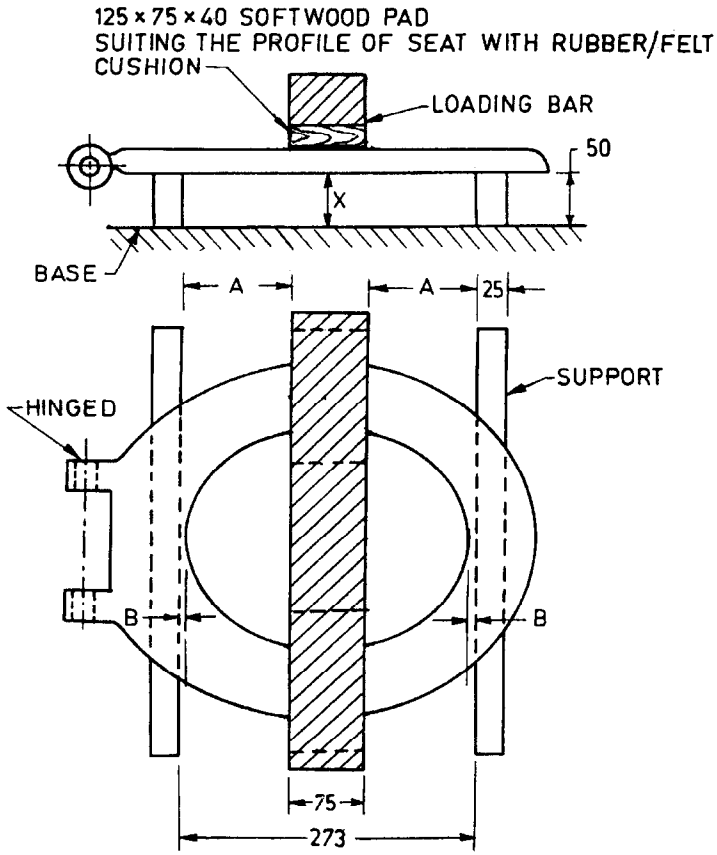


Fig. 5 ARRANGEMENT FOR TESTING RIGIDITY OF SEATS

## ANNEX G

*(Clause* 9.4.2 )

### TEST FOR RIGIDITY OF COVERS

**G-1 OBJECT**

The object of the rigidity test is to ensure that if the cover, when closed, is sat upon, it does not fracture, neither are its edges pushed through the opening in the seat.

**G-2 APPARATUS**

**G-2.1 Water-Closet** — complying with the requirements of IS 2556 (Part 2) : 1994.

**G-2.2 Seat** — with which the cover is to be supplied.

**G-2.3 Scale** — capable of measuring to 1 mm.

**G-2.4 A Means of Applying Load** — capable of applying a load equivalent to a weight of 65 kg (650 *N* approximately) to the specimen cover through an indentor whose dimensions are given in Fig. 6.

**G-2.5 Fixed Reference Point** — near the top of the indentor when it is resting on the cover.

**G-3 PROCEDURE**

**G-3.1** Assemble the cover to the seat, and the seat to the water-closet. Place the water-closet, seat and cover under the loading apparatus, with the cover closed, so that the indentor will rest on the cover at a point corresponding to the centre of the opening in the seat. Lightly rest the unloaded indentor on the cover and measure the vertical distance $X_1$ from the fixed reference point to the top of the spherical part of the indentor to the nearest 1 mm. Apply an effective load as given in **G-2.4** to the indentor resting on the cover. After 10 minutes measure the vertical distance $X_2$ from the fixed reference point to the top of the spherical part of the indentor to the nearest 1 mm.

**G-3.2** Repeat the test a second time, placing the indentor at some other point of the cover.

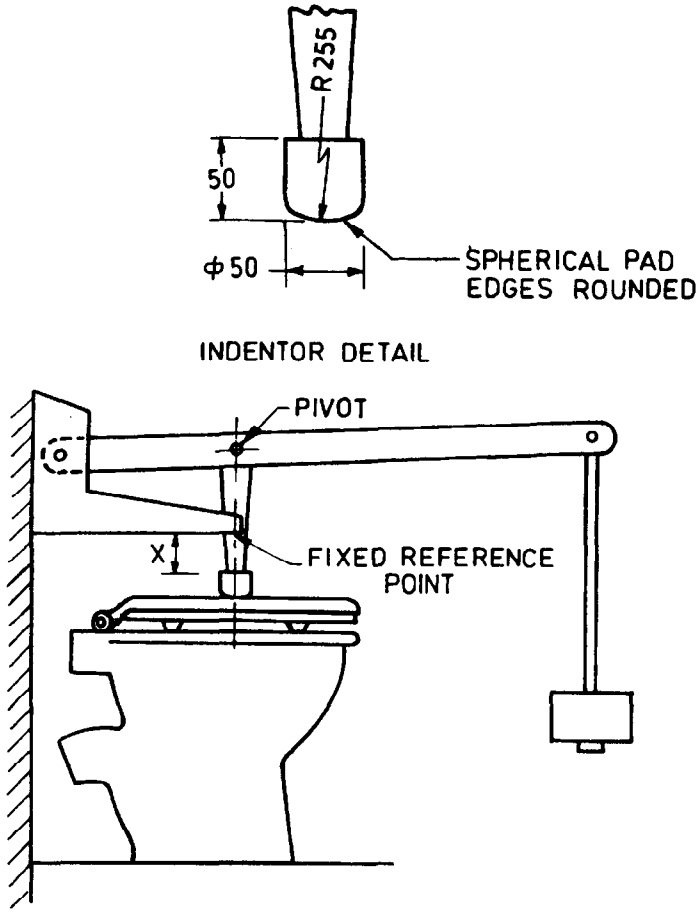


FIG. 6 ARRANGEMENT FOR TESTING RIGIDITY OF COVERS

### G-4 REPORTING

Calculate the deflection as $X_2-X_1$. Record the deflection as the greater of the deflections measured in the two tests. Examine the cover after each deflection test to see if any part of the edge of the cover has been forced through the opening in the seat, and to see if any fracture has occurred.

## ANNEX H

(*Clause* 9.4.3)

### TEST FOR DISTORTION OF SEATS AND COVERS

### H-1 OBJECT

The object of the test is to ensure that when the seat and cover are correctly mounted on the hinging device supplied with them, the seat lies reasonably flat upon the water-closet, the cover lies reasonably flat upon seat and no unsightly gaps occur in the assembly.

### H-2 APPARATUS

**H-2.1 Rigid Flat Base** — to which the hinging device supplied with seat and cover may be attached.

**H-2.2 Scale** — capable of measuring to 1 mm.

### H-3 PROCEDURE

Attach the seat to the base and, if possible, adjust the hinge to achieve a minimum gap between the underside of the buffers and the base. Inspect the buffers to see if there is a gap between the underside of the buffers and the base. Measure any gap to the nearest 1 mm. Close the cover and measure any gaps that exist between the underside

of each buffer and the top of the seat to the nearest 1 mm.

**H-4 REPORTING**

Record the measurements.

## ANNEX J

*(Clause 9.5)*

### TEST FOR STAINING BY SEATS AND COVERS

**J-1 OBJECT**

The object of the test is to ensure that the material of the seat and cover does not stain the user.

**J-2 PROCEDURE**

Ensure that the seat or cover is dry. Rub the seat or cover rapidly with a moist white cotton cloth for a period of not less than 5 seconds.

**J-3 REPORTING**

Examine the cloth to see if any colour has been transferred to it.

## ANNEX K

*(Clause 9.6)*

### TEST FOR STAINING AND/OR OTHER SURFACE DETERIORATION OF SEATS AND COVERS

**K-1 OBJECT**

The object of the test is to ensure that the cleansers and polishes described on the informative label attached to the seat or cover (*see* **14.2**) do not, when used in the manner described on the label, stain the seat or cover and thereby spoil their appearance.

**K-2 PROCEDURE**

**K-2.1** Apply one of the cleansers specified on the informative label [*see* **14.2.3**(a)], by the appropriate method described on the label [*see* **14.2.3**(c)], to half the area of the seat and half the area of the cover. Allow the treated seat and cover to stand for 1-1/4 hours. Compare the areas treated with cleanser and polish and note any changes in colour or in any other surface characteristic.

**K-2.2** Repeat the test with the polish five times. Treat the same area each time.

**K-2.3** After 24 hours, ensure that the seat or cover is dry. Apply one of the polishes specified on the informative label [*see* **14.2.3**(b)], by the appropriate method described on the label [*see* **14.2.3**(c)], to half the area of the seat and the cover that was treated with cleanser. Allow the treated seat and cover to stand for 1-1/2 hours. Compare the areas treated with cleanser and polish with the untreated areas and note any changes in colour or in any other surface characteristics.

**K-2.4** Repeat the test with the polish five times. Treat the same area each time.

**K-2.5** For all the combinations of cleansers and polishes specified on the informative label, repeat the complete test using different seat and cover for each combination.

**K-3 REPORTING**

Note any change in colour or in any other surface characteristic together with the stage of the treatment at which it took place.

## ANNEX L

*(Clause 9.7)*

### TEST FOR SURFACE HARDNESS OF SEATS AND COVERS

**L-1 OBJECT**

The object of the surface hardness test is to ensure that the seat and cover are able to resist unacceptable indentation.

**L-2 APPARATUS**

**L-2.1 Rockwell Hardness Tester** — having an L scale indentor, a diameter of 6.350 ± 0.002 5 mm and an effective major load of 588.4 *N* (60 kgf).

### L-3 PROCEDURE

**L-3.1** The sample shall be conditioned at ambient temperature and humidity for at least 24 hours after manufacture. Bring the indentor into the lightest possible contact with any appropriate flat part of the seat or cover but not within 6 mm of the edge or previous indentations. Apply the 'minor' load of 98.1 *N* (10 kgf) which operates when the small pointer is at zero and the large pointer is within ± 5 divisions of the B30 or 'set' position on the red scale. Within 10 seconds, apply the major load by operating the trip lever. Remove the major load 15 ± 1.0 second after its application. Read 15 seconds after removing the major load, to the nearest full division, the Rockwell hardness on the red scale.

**L-3.2** Repeat the test five times, on the seat and on the cover.

### L-4 REPORTING

Calculate the average of the six readings both for the seat and the cover.

## ANNEX M

*(Clause* 9.8)

### ENDURANCE TEST FOR SEAT, COVERS AND BUFFER

### M-1 OBJECT

The object of the test is to ensure that the seat, cover and buffers are robust enough to withstand loads arising from normal conditions of use.

### M-2 APPARATUS

**M-2.1 Water-Closet** — complying with requirements of IS 2556 (Part 2) : 1994.

### M-3 PROCEDURE

Assemble the seat and cover to the water-closet with hinging device supplied. Raise the seat and cover to the vertical position and allow it to fall freely onto the water-closet, continuously 300 times.

### M-4 REPORTING

Inspect the seat, cover and buffers for any damage or dislocation.

## ANNEX N

*(Clause* 13.1)

### SAMPLING AND CRITERIA FOR CONFORMITY

### N-1 SAMPLING

#### N-1.1 Lot

In any consignment, all the seats and covers from the same batch of manufacture shall be grouped together to constitute a lot.

**N-1.2** The number of seats and covers to be selected from a lot shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 2.

**Table 2 Sample Size and Permissible Number of Defectives**

| Lot Size *N* (1) | Sample Size *n* (2) | Permissible No. of Defectives (3) | Sub-sample Size (4) |
|---|---|---|---|
| Up to 100 | 15 | 1 | 3 |
| 101 to 200 | 20 | 2 | 4 |
| 201 to 300 | 30 | 3 | 5 |
| 301 to 500 | 40 | 3 | 7 |
| 501 to 800 | 55 | 4 | 8 |
| 801 and above | 75 | 6 | 10 |

**N-1.2.1** These seats and covers shall be selected at random. In order to ensure randomness of selection, the following procedure may be adopted:

Starting from any seat and cover in the lot, count them as 1,2,3,....., up to *r* in a systematic manner,where *r* is the integral part of *N/n*, *N* being the lot size and *n* the sample size. Every *r*th seat and cover thus counted shall be separated until the requisite number is obtained.

### N-2 NUMBER OF TESTS

**N-2.1** All the seats and covers selected as in **N-1.2** shall be examined for their conformity with the requirements of **5** to **8**.

**N-2.2** The number of seats and covers to be tested as mentioned in **9** shall be in accordance with col 4 of Table 2. These seats and covers shall be selected out of those already selected as in **N-1.2**.

## N-3 CRITERIA FOR CONFORMITY

**N-3.0** The lot shall be considered as conforming to the requirements of this specification if the conditions in **N-3.1** and **N-3.2** are satisfied.

**N-3.1** The number of seats and covers failing to satisfy one or more of the requirements specified in **5** to **8** shall not exceed the corresponding number given in col 3 of Table 2.

**N-3.2** All the seats and covers tested as in **9** shall satisfy the requirements of the tests. In case there is only one failure, twice the number of seats/covers tested shall be selected and subjected to the tests mentioned in **9**. All the seats/covers so tested shall satisfy the requirements of the tests.

# ANNEX P

*(Foreword)*

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(*Continued from page* 15)

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