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IS 9140 (1996): Method for sampling of vitrous and fire clay sanitary appliances [CED 3: Sanitary Appliances and Water Fittings]



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काचाभ और आग से पकी चिकनी मिट्टी के  
स्वच्छता साचित्रों की प्रतिचयन रीति  
( दूसरा पुनरीक्षण )

*Indian Standard*  
METHODS FOR SAMPLING OF VITREOUS AND  
FIRE CLAY SANITARY APPLIANCES  
( *Second Revision* )

ICS 91.140.70

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**BUREAU OF INDIAN STANDARDS**  
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## FOREWORD

This Indian Standard ( Second 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.

The increasing production of sanitary appliances has made it imperative to formulate rational and economic sampling procedures for the proper and objective evaluation of the various characteristics of these appliances. Such sampling procedures will also help in development and expansion of the sanitary appliances industry and also provide adequate protection to the consumer.

Proper quality control during the process of manufacture would substantially reduce the quality fluctuations of the ultimate products. Further, the purchasing organizations may need guidance for economic and effective sampling inspection of the lots being received by them to evaluate their quality before their actual use. The sampling procedures recommended in this standard, therefore, include the provisions for both process control and lot inspection.

This standard was originally issued in 1979 and was first revised in 1985. In this revision, modifications recommended by the expert panel (constituted earlier under the erstwhile Statistics Department of BIS) have been incorporated. Besides, it was felt that the frequency of testing and inspection during process control needs to be reviewed in the light of current trade practices in this field. This opportunity has also been utilised to include or delete requirements according to the various product standards under IS 2556 as revised in 1994 and in 1995 since the first revision of this standard.

The scale of sampling has been based on IS 2500 ( Part 1 ) : 1992 'Sampling inspection procedures: Part 1 Attribute sampling plans indexed by acceptance quality level ( AQL ) for lot-by-lot inspection ( *second revision* )'.

The frequency of testing and inspection for process control as given in 4.3 serves mainly as a guide to the manufacturer and is not mandatory.

In the evaluation of modulus of rupture, water absorption and crazing, recourse has to be taken to the test bars/plates which are prepared by the manufacturer by casting from the same body slip and glaze, dried and fired along with the appliances. To a very large extent, it is true that the test bars/plates possess characteristics similar to the appliances when prepared from the same body slip and glaze and fired side by side in a kiln. This correlation has been assumed in this standard to be reasonably high.

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 '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.

The composition of the committee responsible for the preparation of this standard is given in Annex B.

*Indian Standard***METHODS FOR SAMPLING OF VITREOUS AND  
FIRE CLAY SANITARY APPLIANCES***( Second Revision )***1 SCOPE**

This standard prescribes methods for sampling and criteria for conformity of vitreous and fire clay sanitary appliances manufactured in accordance with various parts of IS 2556 and IS 771 respectively. Broad outlines with regard to controls to be exercised during the process of manufacture have also been included in this standard.

**2 REFERENCES**

The Indian Standards given in Annex A are necessary adjuncts to this standard.

**3 TERMINOLOGY**

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

**3.1 Item**

Ultimate unit of product on which inspection will be performed.

**3.2 Defective**

An item, the quality of which does not meet the specific requirements.

**3.3 Lot**

A collection of items of single pattern (including all sizes) such as sinks, wash basins, cisterns, closets, etc, manufactured under relatively uniform conditions of manufacture, such as uniform materials, similar

processes and firings shall constitute a lot.

**3.4 Lot Size**

Number of items in the lot.

**3.5 Sample**

Group of items drawn from a lot for inspection.

**3.6 Sample Size**

Number of items in the sample.

**3.7 Acceptance Number**

The maximum permissible number of defectives in the sample for acceptance of the lot

**4 PROCESS CONTROL**

**4.1** The inspection done by the manufacturer during production is to ensure uniformity and reduce quality fluctuations to the minimum whereas the object of inspection of sanitary appliances by the purchaser is to ensure their compliance to the specified requirements.

**4.2** The manufacturer should use all raw materials after appropriate tests to ensure that no substandard raw materials go into production. The raw materials may be tested to ensure their conformity to relevant Indian Standards/manufacturer's standard.

**4.3** The manufacturer should carry out the inspection at various stages in the process of manufacture. It is recommended to institute systematic inspection on the following stages at the frequency level indicated:

<i>Stage</i>	<i>Recommended Frequency of Inspection and Testing</i>
1. Mould:	
a) For chippage/breakage	Each mould:
b) For shape, dimensions, ovality, etc	i) 10 percent of moulds manufactured everyday, selected randomly.
	ii) 5 percent of the moulds in use selected randomly once every fortnight.
2. Mix (casting slip) before moulding	One test per day for requirements like fineness, density, viscosity, casting rate, etc.

<i>Stage</i>	<i>Recommended Frequency of Inspection and Testing</i>
3. Greenwares before glazing:	
a) For construction, warpage and visual requirements	Each individual ware.
b) For minimum thickness	1 in 100 of each type and pattern ( total not exceeding 5 in number) manufactured in a day. Preferably thickness measurement may be done on wares broken during normal handling/rejections.
4. Wares after firing:	
a) Construction	Each appliance
b) Finish	do
c) Warpage	do
d) Visual requirements ( blemishes and defects )	do
e) Minimum thickness	Two appliances of each type and pattern from a day's production in case of a continuous kiln and from each firing in case of intermittent kiln.
	NOTE — For this test, appliances which are broken/rejected during normal process of manufacturing/handling, chosen at random, can also be used.
f) Dimensions	Five appliances of each type and pattern from a day's production in case of a continuous kiln and from each firing in case of an intermittent kiln. All the five should pass, otherwise 100 percent inspection.
g) Flushing test, and cleanability test (wherever applicable)	Five appliances of each type and pattern from a day's production in case of a continuous kiln and from each firing in case of an intermittent kiln. All the five should pass, otherwise 100 percent inspection.
h) Water absorption	Three sample pieces from every day's production in case of a continuous kiln and from each firing in case of an intermittent kiln. Alternatively, this test may be done on test pieces separately made as specified in 10.3 of IS 2556 (Part 1) : 1994.
j) Crazeing	Three sample pieces twice a week in case of a continuous kiln and from every firing in case of an intermittent kiln. Alternatively, this test may be done on test pieces separately made as specified in 10.2 of IS 2556 (Part 1) : 1994.
k) Test for chemical resistance	Eight sample test pieces once a week in case of a continuous kiln and from every firing in case of an intermittent kiln.
m) Test for resistance to staining and burning	Two sample pieces once a week in case of a continuous kiln and from every firing in case of an intermittent kiln.
n) Test for modulus of rupture	This test shall be done on test pieces separately made as specified in 10.5 of IS 2556 ( Part 1 ) : 1994.
p) Test for thermal shock ( for fireclay wares only )	Two sample pieces once a week in case of a continuous kiln and from every firing in case of an intermittent kiln.

4.4 For effective process control, the use of statistical quality control technique is recommended and guidance may be obtained in this respect from IS 397 ( Part 1 ) : 1972, IS 397 ( Part 2 ) : 1985 and IS 397 ( Part 3 ) : 1980.

4.5 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.

4.5.1 When such information cannot be made available to the purchaser or when the purchaser so desires, the procedure laid down in 5 shall be followed for judging the conformity of the lot.

**5 LOT INSPECTION**

**5.1 Non-destructive Tests**

The following tests can be done without causing any damage to the items:

- a) Visual ( permissible blemishes and defects, finish and marking ), warpage, dimensions and construction; and
- b) Flushing and cleanability test, wherever applicable.

**5.1.1 Scale of Sampling and Criteria for Conformity for Visual Requirements**

The number of appliances to be selected from a lot shall be in accordance with col 1 and 2 of Table 1. While taking samples from the lot, approximately, equal number of appliances shall be taken for each size so as to constitute the requisite sample size. Each appliance in the sample shall be subjected to visual inspection. An appliance failing in one or more of these requirements shall be considered as defective.

NOTE — In case the number of different sizes in a lot exceeds the sample size, at least one appliance from each size shall be taken and appliances so selected shall constitute the requisite sample size. In such cases, the sample size may consist of more number of appliances than given in col 2 of Table 1. However, the corresponding acceptance numbers given in col 3 of Table 1 shall be used for the purpose of deciding the conformity of the lot.

5.1.1.1 These appliances shall be selected at random from the lot, in accordance with IS 4905 : 1968.

5.1.1.2 The lot shall be considered as conforming to the visual requirements if the number of defectives found in the sample does not exceed the corresponding acceptance number given in col 3 of Table 1.

**Table 1 Scale of Sampling and Acceptance Number**  
( Clause 5.1.1 )

Number of Appliances in the Lot	Sample Size	Acceptance No.
(1)	(2)	(3)
Up to 25	8	0
26 to 50	13	0
51 " 90	20	1
91 " 150	32	2
151 " 280	50	3
281 " 500	80	5
501 " 1 200	125	7

**5.1.2 Scale of Sampling and Criteria for Conformity for Warpage, Dimensional, Construction, Flushing and Cleanability Test ( Wherever Applicable )**

The number of appliances to be selected at random for these tests from a lot having been found satisfactory according to 5.1.1 shall be in accordance with Table 2.

**Table 2 Scale of Sampling and Acceptance Number**  
( Clauses 5.1.2 and 5.1.2.2 )

Number of Appliances in the Lot	Sample Size	Acceptance No.
(1)	(2)	(3)
Up to 90	5	0
91 to 150	8	0
151 " 500	13	0
501 " 1 200	20	1

5.1.2.1 These appliances shall be selected at random ( see IS 4905 : 1968 ) from the appliances already inspected and found satisfactory according to 5.1.1.2.

5.1.2.2 The lot shall be considered as conforming to these requirements if the number of defectives do not exceed the acceptance number given at col 3 of Table 2.

**5.2 Destructive Tests**

5.2.1 These include the tests for minimum thickness, crazing, water absorption, chemical resistance, resistance to staining and burning, modulus of rupture and thermal shock.

5.2.2 For lots, if found satisfactory according to 5.1.2.2, one test for lots containing up to 280 items, two tests for lots containing 281 to 500 items and three tests for lot containing more than 500 items shall be conducted for each of these requirements.

5.2.3 The lot shall be considered as conforming to the requirements of the relevant specification if in respect of each of these requirements the relevant test(s) is found satisfactory.



**ANNEX A**  
( Clause 2 )

**LIST OF REFERRED INDIAN STANDARDS**

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
397	Methods for statistical quality control during production	2556	Specification for vitreous sanitary appliances ( Vitreous China )
( Part 1 ) : 1972	Control charts for variables ( <i>first revision</i> )	( Part 1 ) : 1994	General requirements ( <i>third revision</i> )
( Part 2 ) : 1985	Control charts for attributes and count of defects ( <i>second revision</i> )	( Part 2 ) : 1994	Specific requirements of wash down water closets ( <i>fourth revision</i> )
( Part 3 ) : 1980	Special control charts	( Part 3 ) : 1994	Specific requirements of squatting pans ( <i>fourth revision</i> )
771	Specification for glazed fireclay sanitary appliances:	( Part 4 ) : 1994	Specific requirements of wash basins ( <i>third revision</i> )
( Part 1 ) : 1979	General requirements ( <i>second revision</i> )	( Part 5 ) : 1994	Specific requirements of laboratory sinks ( <i>third revision</i> )
( Part 2 ) : 1985	Specific requirements of kitchen and laboratory sinks ( <i>third revision</i> )	( Part 6 ) : 1995	Specific requirements of urinals and partition plates ( <i>fourth revision</i> )
( Part 3/Sec 1 ) : 1979	Part 3 Specific requirements of urinals, Section 1 Slab urinals ( <i>second revision</i> )	( Part 7 ) : 1995	Specific requirements of accessories for sanitary appliances ( <i>third revision</i> )
( Part 3/Sec 2 ) : 1985	Part 3 Specific requirements of urinals, Section 2 Stall urinals ( <i>third revision</i> )	( Part 8 ) : 1995	Specific requirements of pedestal close coupled wash down and syphonic water closets ( <i>fourth revision</i> )
( Part 4 ) : 1979	Specific requirements of post-mortem slabs ( <i>second revision</i> )	( Part 9 ) : 1995	Specific requirements of pedestal type bidets ( <i>fourth revision</i> )
( Part 5 ) : 1979	Specific requirements of shower trays ( <i>second revision</i> )	( Part 14 ) : 1995	Specific requirements of integrated squatting pans ( <i>first revision</i> )
( Part 6 ) : 1979	Specific requirements of bed-pan sinks ( <i>second revision</i> )	( Part 15 ) : 1995	Specific requirements of universal water closets ( <i>first revision</i> )
( Part 7 ) : 1991	Specific requirements of slop sinks ( <i>second revision</i> )	4905 : 1968	Methods for random sampling

## ANNEX B

( Foreword )

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