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IS 774 (2004): Flushing Cistern for Water Closets and Urinals (Other Than Plastic Cisterns) - [CED 3: Sanitary Appliances and Water Fittings]



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भारतीय मानक

अंग्रेजी टट्टियों व मूत्रालयों के लिए प्रधावन टंकियाँ
(प्लास्टिक की टंकियों को छोड़कर) — विशिष्टि
(पाँचवा पुनरीक्षण)

Indian Standard

FLUSHING CISTERNS FOR WATER CLOSETS
AND URINALS (OTHER THAN PLASTIC
CISTERNS) — SPECIFICATION
(*Fifth Revision*)

ICS 91.140.70

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

**AMENDMENT NO. 1 SEPTEMBER 2006
TO
IS 774 : 2004 FLUSHING CISTERNS FOR WATER
CLOSETS AND URINALS (OTHER THAN PLASTIC
CISTERNS) — SPECIFICATION**

(Fifth Revision)

(Second cover page, Foreword, Para 3) — Delete.

(CED 3)

Reprography Unit, BIS, New Delhi, India

FOREWORD

This Indian Standard (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 1957. The first, second, third and fourth revisions were issued in 1960, 1969, 1971 and 1984 respectively. In this revision, flushing cisterns of 6/3 litres capacity have been included. Other changes keeping in view the current manufacturing practices in the country have been made.

Two years from the date of publication of the standard, single flush cistern will be withdrawn from the scope of this standard.

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.

Indian Standard

FLUSHING CISTERNS FOR WATER CLOSETS AND URINALS (OTHER THAN PLASTIC CISTERNS) — SPECIFICATION

(*Fifth Revision*)

1 SCOPE

1.1 This standard covers requirements for manually-operated high-level and low-level flushing cisterns of capacities, 5 litres and 10 litres, both single-flush and dual-flush types and 6/3 litres capacity dual-flush cisterns, for water-closets, squatting pans and urinals, together with flush pipe details

1.2 Plastic flushing cisterns are not covered in this standard

2 REFERENCES

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

<i>IS No</i>	<i>Title</i>
210 1993	Grey iron casting — Specification (<i>fourth revision</i>)
404 (Part 1) 1993	Lead pipes — Specification Part 1 For other than chemical purposes (<i>third revision</i>)
407 1981	Specification for brass tubes for general purposes (<i>third revision</i>)
513 1994	Cold-rolled low carbon steel sheets and strips (<i>fourth revision</i>)
1239 (Part 1) 1990	Mild steel tubes, tubulars and other wrought steel fittings — Specification Part 1 Mild steel tubes (<i>fifth revision</i>)
1477 (Part 1) 1971	Code of practice for painting of ferrous metal in buildings Pretreatment (<i>first revision</i>)
(Part 2) 1971	Painting (<i>first revision</i>)
1703 2000	Water fittings — Copper alloy float valves (horizontal plunger type) — Specification (<i>fourth revision</i>)
2267 1995	Polystyrene moulding and extrusion materials — Specification (<i>second revision</i>)
2501 1995	Solid drawn copper tubes for general

*IS No**Title*

2556 (Part 1) 1994	engineering purposes — Specification (<i>third revision</i>) Specification for vitreous sanitary appliances (vitreous china) Part 1 General requirements (<i>third revision</i>)
2643 1999	Pipe threads where pressure-tight joints are not made on the threads — Dimensions, tolerances and designation (<i>second revision</i>)
7328 1992	High density polyethylene materials for moulding and extrusion — Specification (<i>first revision</i>)
9762 1994	Specification for polyethylene floats (spherical) for float valves (<i>first revision</i>)
12234 1988	Specification for plastic equilibrium float valve for cold water services
13049 1991	Specification for diaphragm type (plastic body) float-operated valves for cold water services

3 TERMINOLOGY

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

3.1 High-Level Cistern — A cistern intended to operate at a minimum height of 1 250 mm between the top of the pan and the underside of the cistern

3.2 Low-Level Cistern — A cistern intended to operate at a height not exceeding 300 mm between the top of the pan and the underside of the cistern. In case of Orissa pan/squatting pan, minimum distance between top of pan and the underside of the cistern shall be 700 mm

3.3 Coupled Cistern — A cistern intended to operate to sitting on flat surface provided at the back portion of wash-down water-closets

3.4 Dual-Flush Cistern — A construction that enables the user to cause a short flush of partial discharge when only urine needs to be flushed away instead of the customary full flush

NOTE — A typical illustration of siphonic dual flush cisterns is given in Fig. 1 and non-siphonic dual flush cisterns in Fig. 2

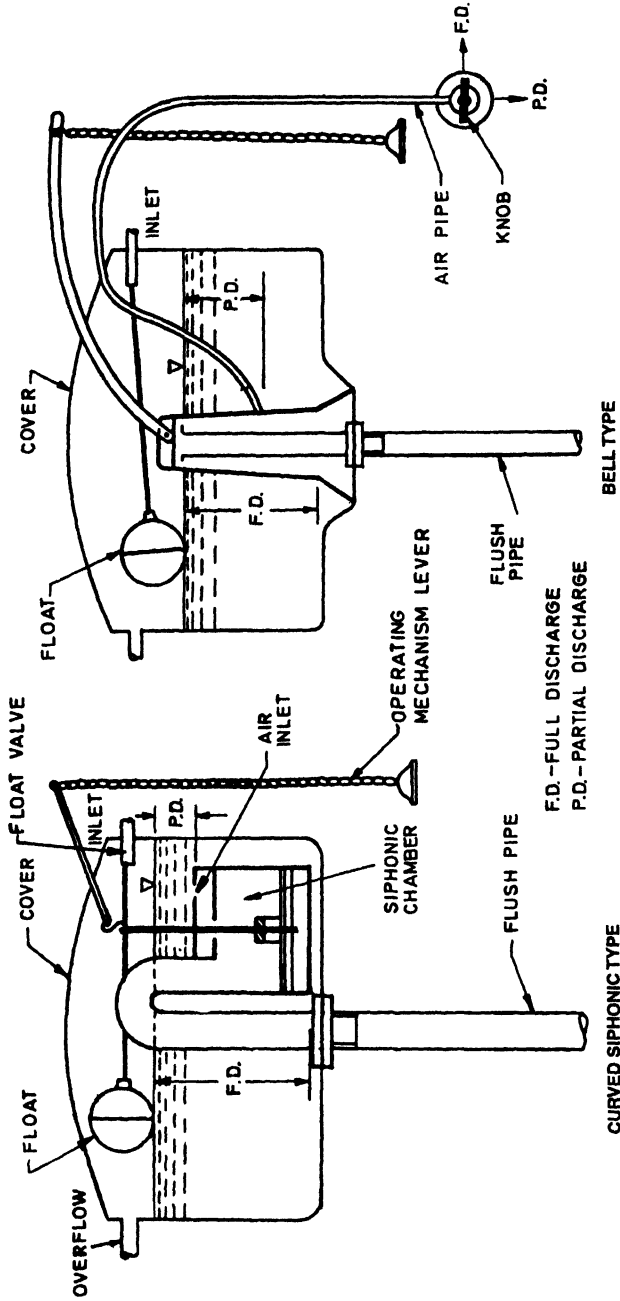


FIG. 1 TYPICAL ILLUSTRATION OF SIPHONIC TYPE DUAL-FLUSH CISTERNS

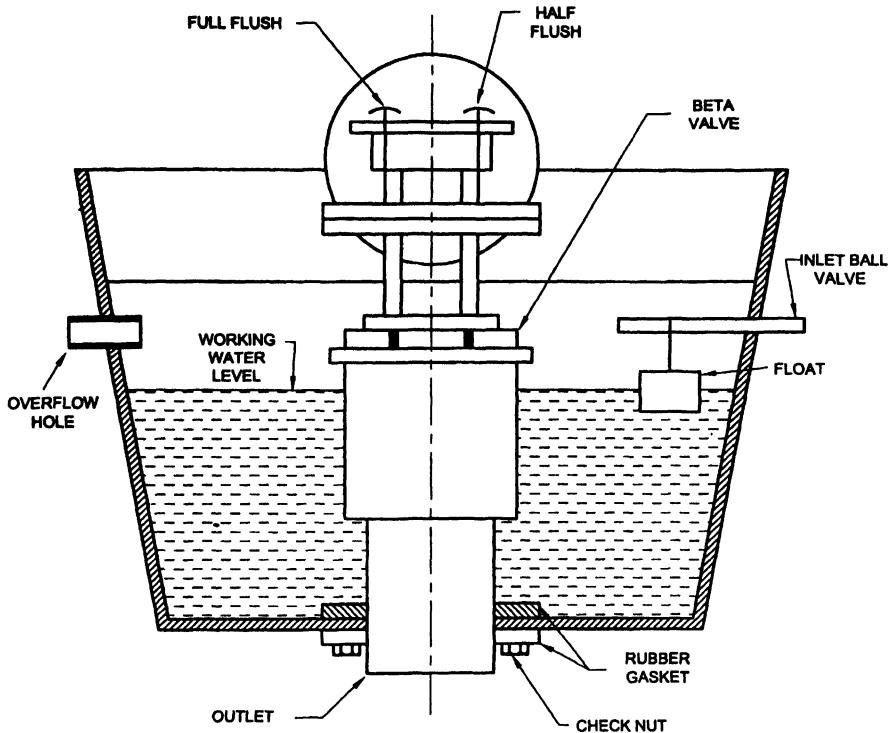


FIG. 2 TYPICAL ILLUSTRATION OF NON-SIPHONIC DUAL-FLUSH CISTERNS

4 MATERIALS

The materials for manufacturing various components of the flushing cisterns shall conform to the requirements given in Table 1.

NOTE — Where the requirements for the materials of any components or the relevant Indian Standard designation for any materials are not specified, these shall be as agreed to between the manufacturer and the purchaser.

5 CONSTRUCTION

5.1 Cistern

The thickness of the body including cover shall be not less than 5 mm and 6 mm for cast iron and vitreous china cisterns respectively. The body of the pressed steel cistern shall be of seamless or welded construction. The body and cover of the pressed steel cistern shall be of thickness not less than 1.6 mm and 1.25 mm respectively before coating and shall be vitreous enamelled or otherwise protected against

corrosion by equally efficient coating. The cistern shall be free from manufacturing faults and other defects affecting its utility. All working parts shall be designed so as to operate smoothly and efficiently. The cistern shall be mosquito-proof; it shall be deemed to be mosquito-proof only when there is no clearance anywhere in it which would permit a 1.6 mm diameter wire to pass through. The outlet of each siphon or stand pipe shall be securely connected to the cistern by means of a lock-nut. In the case of plastic siphon, it shall be provided with suitable means of ensuring and maintaining water-tight and air-tight joint to the cistern.

5.2 Cover

The cistern shall be provided with a removable cover, which shall fit closely and shall be secured against displacement. In designs where the operating mechanism is attached to the cover, the cover may be made in two sections, the section supporting the mechanism being securely bolted or screwed to the body.

Table 1 Materials for Various Components of Flushing Cisterns
(Clause 4)

Sl No	Components	Material	Requirement/Conforming to
(1)	(2)	(3)	(4)
i)	Cistern	Cast iron	Quality not less than Grade FG 150 of IS 210 IS 2556 (Part 1)
		Vitreous china	
		Enamelled pressed steel	
		a) Pressed steel	IS 513
		b) Vitreous enamelling	IS 1239 (Part 1)
ii)	Flush pipe	Steel tube, seamless or welded, medium or light, completely protected inside and outside by hot-dip galvanizing, electro-plating or vitreous enamelling	IS 1239 (Part 1)
		Lead pipe	IS 404 (Part 1)
		Copper alloy tube	IS 407 or IS 2501
		High density polyethylene pipe	—
		Unplasticized PVC pipe	—
iii)	Cover	Same material as that of the body	—
iv)	Chain	Hot-dip galvanized steel wire, inter-locked non-ferrous metal or any other corrosion-resistant material	—
v)	Overflow pipe	Non-ferrous metal, high density polyethylene, unplasticized PVC or any other corrosion-resistant material	—
vi)	a) Siphon (where provided)	Cast iron/Vitreous china	Grade FG 150 or higher of IS 210 IS 2556 (Part 1)
	b) Siphon/valve	High density polyethylene (HDPE)/ Polystyrene, high impact/ Polypropylene/ Glass fibre reinforced plastic (GRP)/ Acrylonitrile-butadiene styrene (ABS)	IS 7328 IS 2267 — — —
vii)	Lever	Cast iron/ Non ferrous metal or any other corrosion-resistant material	Quality not less than Grade FG 150 of IS 210
viii)	Float valve	—	IS 1703/IS 12234/IS 13049
ix)	Polyethylene float for float valve	—	IS 9762
x)	Bolts and nuts	Non-ferrous metal or hot-dip galvanized steel	—
xi)	Coupling nut and lock-nut	Non-ferrous metal hot-dip galvanized steel hot-dip galvanized malleable iron or any other non-corrosive metal or injection moulded HDPE/PVC (see 5 3 1)	—

5.3 Flush Pipe

The flush pipe (except plastic flush pipe) shall have an internal diameter of 32 ± 1 mm for high-level cisterns and 38 ± 1 mm for low-level cisterns. The steel flush pipe shall be not less than 1 mm thick, whereas the lead flush pipe shall have a minimum thickness of 3.5 mm. For high density polyethylene and unplasticized PVC pipes, the outside diameter of the pipes shall be 40 mm. When PVC plumbing pipes are used, the outside diameter of the pipe shall be 40 mm for high-level cisterns, and 50 mm for low-level cisterns. In the case of high-level flushing cisterns, a pipe clip fitted with a rubber buffer shall be fixed to the flush pipe to prevent damage either to the pipe or to the seat when the seat is raised. No flush pipe is required for coupled cisterns.

NOTE — The minimum thicknesses specified are for normal conditions of service where highly corrosive atmospheres are expected greater thicknesses are recommended.

5.3.1 Flush Pipe Connection to Cistern

The flush pipe shall be securely connected to the cistern outlet and made air-tight by means of a coupling nut. The nuts made of injection-moulded HDPE/PVC may be used only, if the end pipe is also made of plastic. The nominal internal diameter of the cistern outlet shall be not less than 32 mm and 38 mm for high-level and low-level cisterns respectively. The screw threads for the flush pipe shall conform to size $1\frac{1}{2}$ (see IS 2643) and the matching nut of the same material shall be used and there shall be no leakage under a full load of 10 litres. The above test shall be conducted 10 times by removing and refixing the nut. In the case of polyethylene and unplasticized PVC flush pipes, the upper end of the flush pipe shall be provided with suitable means of ensuring and maintaining a water-tight and air-tight joint to the flushing cistern and the flush pipe shall be detachable from the flushing cistern. When ordered for use with

a lead flush pipe, the outlet connection may be supplied with coupling nut made of a copper based alloy or other non-corrodible material and a plain tail piece having a minimum length of 6 cm. The centre of the outlet hole shall be generally central to the length of the cistern. The length of the outlet shall be 37 ± 2 mm.

NOTE — The length of the cistern outlet shall be the dimension from the bottom surface of the cistern to the end of the outlet after the cistern with siphon/stand pipe has been duly fitted with all washers, lock nuts, etc.

5.4 Inlet and Overflow Holes

The cistern shall be provided with inlet and overflow holes, situated one at each end which shall be capable of accommodating an overflow pipe of not less than 20 mm nominal bore and a 15 mm size float valve (see 5.5). The holes shall be cleanly cast or drilled and the adjacent surfaces shall be smooth.

5.5 Float Valve

The float valve shall be of 15 mm nominal size and shall conform to IS 1703 or IS 12234 or IS 13049.

5.6 Lever

The lever shall not project beyond the side of the cistern for a distance greater than 350 mm measured from the centre of the cistern to the end of the lever arm. The lever arm shall be provided with a suitable hole near the end through which a split ring or S-hook can be inserted. A chain shall be attached to the ring or hook. When S-hook is employed, it shall be effectively closed after assembly to prevent accidental disconnection.

In the case of low-level cisterns, where the mechanism is handle operated, the handle, whether situated on the front or at the end of the cistern, shall be within the projection limit for lever given above. Particular attention shall be given to the ease of operation of the handle.

5.7 Chain

The chain shall be of such a strength as to sustain a dead load of 50 kg without any apparent or permanent deformation of the shape of the links.

The chain shall terminate in a suitable handle or pull made of hot-dip galvanized iron or non-ferrous metal or a moulding in any heat resisting and non-absorbent plastic or any other equally suitable material. The finish shall be smooth and all burrs which are liable to cause injury to the hand shall be removed.

5.8 Overflow Pipe

The overflow pipe shall be of not less than 20 mm nominal bore and shall incorporate a non-corrodible

mosquito-proof device secured in a manner which will permit it to be readily cleaned or renewed when necessary. No provision shall be made whereby the overflow from the cistern shall discharge directly into the water-closet or soil pipe without being detected.

The invert of the overflow pipe in the case of high-level and low-level cisterns and the top edge of the overflow pipe in the case of coupled cisterns shall be 19 mm minimum above the working water level. In case of overflow due to any reason, water should drain out through the overflow pipe and not through the siphon pipe (see 7.3).

6 FINISH

Cast iron cisterns shall be painted inside with suitable anti-corrosive paint and with a protective coat on the outside before delivery. Moulding sand shall be removed from the surfaces before application of the protective coating. Painting and finishing shall be done in accordance with the recommendations made in IS 1477 (Part 1) and IS 1477 (Part 2). Alternatively cast iron cisterns shall be protected against corrosion by a coating of enamel.

7 OPERATIONAL AND PERFORMANCE REQUIREMENTS

7.1 Flushing Arrangement

The cistern under working conditions and with the ball valve in closed position shall operate on a single operation of the lever without calling for a sudden jerk in pulling. If a valve is used instead of siphon for flushing purposes, the valve shall be completely leakproof.

7.2 Working Water Level

The working water level shall be a minimum of 6.5 cm below the effective top edge of the cistern and shall be legibly and permanently marked on the inside of the cistern.

7.3 Freedom from Self-Siphonage

The siphonic system shall be capable of being rapidly brought into action when the water is at the working water level, but shall not self-siphon or leak into the flush pipe when the water is up to 1 cm above the invert of the overflow pipe.

7.4 Reduced Water Level

The discharge shall operate satisfactorily when the cistern is filled to a level up to 1 cm below the working water level.

7.5 Discharge Capacity

When tested in accordance with the procedure described

in 8.1, cisterns of 5 litres and 10 litres capacities, when required to give a full flush, shall respectively discharge 5 litres and 10 litres with variation of ± 0.5 litres. Dual flush cisterns of 10/5 litres capacity shall discharge alternatively a half flush of 5 ± 0.5 litres. Dual flush cistern of 6/3 litres capacity shall discharge 6 ± 0.5 litres and alternatively a half flush of 3 ± 0.5 litres.

7.6 Discharge Rate

When tested in accordance with the procedure described in 8.2 the discharge rate shall be 10 ± 0.5 litres within 6 s and 5 ± 0.5 litres within 3 s for cisterns of capacities 10 litres and 5 litres and 6 ± 0.5 litres within 6 s and 3 ± 0.5 litres within 3 s for cisterns of capacity 6/3 litres. The cisterns shall be so designed that there is no appreciable variation in the force of the flush during the discharge of the required quantity of water. For coupled cisterns, this test shall not be applicable.

8 TESTING

Cisterns shall be tested in accordance with the test procedures given in 8.1, 8.2 and 8.3. The tests in 8.1 and 8.2 may be combined in one operation, if desired.

8.1 Test of Discharge Capacity

With the water supply shut off or the cistern disconnected, and with the ball valve fitted, fill the cistern with water up to the marked water line. Operate the flushing mechanism and on completion of the flush, measure the quantity of water that has to be added to refill the cistern to the level of the marked water line. Alternatively, any suitable device may be used for measuring the quantity of water discharged from the cistern. The cistern should have a flush pipe fitted but need not be connected to a pan for this test.

8.2 Test for Discharge Rate

Connect the cistern to an appropriate flush pipe (see 8.2.1). Fill the cistern to the water line as for the capacity test and place a vessel under the open end of the flush pipe. Operate the flush mechanism and as water appears at the open end of the flush pipe start a stop watch. At the end of 6 s in case of cistern of 10 litres and 6/3 litres capacity, 3 s in case of cistern of 5 litres capacity, rapidly draw the vessel clear or otherwise divert the flow of water. Ascertain either by measuring or weighing the volume of water collected in the vessel.

8.2.1 For the purpose of test, the following shall be deemed to be the appropriate flush pipe:

- a) A vertical steel pipe, 1 250 mm long, having a nominal internal diameter of 32 mm, in the case of high-level cisterns, and
- b) A vertical steel pipe, 300 mm long, having a

nominal internal diameter of 38 mm. In case of Orissa pan/squatting pan, pipe shall be minimum 700 mm long.

8.3 Endurance Test

A sample of flushing cistern picked at random from production shall be first checked for conformity to the requirements for materials (see 4) and construction (see 5) and operational and performance requirements (see 7) and if it complies with these requirements, it should be operated 3 000 times. After this test, the cistern and its component parts shall not show any damage or defects and all the parts shall be satisfactory, necessary checks shall be made for this purpose. If a valve has been used instead of siphon, during the test run of 3 000 times the valve should show no sign of leakage when the cistern is operated to its rated capacity.

NOTE — This is a type test to be carried out by recognized testing laboratory and shall be conducted whenever there are changes in the design, materials, manufacture and construction.

9 SAMPLING AND CRITERIA FOR CONFORMITY

The sampling procedure and criteria for conformity of a lot to the requirements of this specification shall be as specified in Annex A.

10 SUPPLY CONDITIONS

10.1 High-level flushing cisterns shall normally be supplied without flush pipes. If agreed to between the supplier and the purchaser, the flush pipes can be supplied with high-level cisterns, in which case these shall conform to the requirements given in 5.3, 5.3.1, and Table 1.

10.2 Low-level flushing cisterns shall normally be supplied with flush pipes conforming to the requirements given in 5.3, 5.3.1, and Table 1.

11 OPERATING INSTRUCTIONS FOR DUAL-FLUSH CISTERNS

11.1 Every cistern of the dual-flush type shall bear in legible lettering in a conspicuous position the operating instructions specified in 11.1.1 to 11.1.3 and these instructions shall not be readily removable. In addition, when so ordered by the purchaser, a separate self-adhesive or other suitable label shall be supplied for use in association with the operating handle when the cistern is installed in a concealed position. Flushing cisterns of 6/3 litres capacity shall be used with sanitary appliances of equivalent capacity.

11.1.1 High-Level Flushing Cisterns

The instruction shall read:

Half-flush	Pull and let go
Full flush	Pull and hold

And shall appear as follows

- a) *For reversible cisterns* — On or near the lower edge of both long sides of the cistern shell, and
- b) *For non-reversible cisterns* — On or near the lower edge of the front of the cistern shell

11.1.2 *Low-Level Flushing Cisterns*

The instruction shall read

- | | |
|------------|------------------|
| Half-flush | Press and let go |
| Full flush | Press and hold |

And shall appear on the upper half of the front of the cistern shell

11.1.3 Where half flush and full flush is operated by a knob, the instructions given in 11.1.1 and 11.1.2 shall not be applicable. Operating instruction specified in 11.1.3.1 shall however be followed

11.1.3.1 Each cistern shall incorporate a dual control method of operation, that is, one initiating a full flush and the other initiating a half flush. Discharge capacities shall be as follows

- a) Full flush 10 ± 0.5 litres or 6 ± 0.5 litres
- b) Half flush 5 ± 0.5 litres or 3 ± 0.5 litres

12 MARKING

12.1 Each cistern shall be indelibly marked with the manufacturer's name or trade-mark on the body either inside or outside as found convenient to the manufacturer. The discharge capacity (see 7.5) and operating instructions (see 11) shall also be marked on the cistern indelibly

12.2 A suitable declaration shall be put on each unit indicating to the consumer the list of components supplied

12.3 BIS Certification Marking

Each cistern may also be marked with the Standard Mark

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

ANNEX A

(Clause 9)

SAMPLING AND CRITERIA FOR CONFORMITY

A-1 LOT

A-1.1 All the cisterns of the same type and level (*see 3*), similar in respect of materials, design and construction and produced essentially under similar conditions of manufacture shall be grouped to constitute a lot

A-2 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

A-2.1 For determining the conformity of the lot to the requirement of material (*see 4*), construction (*see 5*) and finish (*see 6*), a number of sample cisterns in accordance with col 2 of Table 2 shall be selected at random

A-2.1.1 The lot shall be considered to conform to the requirements of material, construction and finish if the number of the sample cisterns not meeting all of these requirements does not exceed the corresponding number given in col 3 of Table 2

A-2.2 If the lot has been found conforming in A-2.1.1, it shall be tested for operational and performance

requirements (*see 7*) for which a number of cisterns (sub-sample) shall be taken at random according to col 4 of Table 2 from the sample cisterns found satisfactory in A-2.1

A-2.2.1 The lot shall be considered to conform to the operational and performance requirements if the number of sample cisterns not meeting these requirements does not exceed the corresponding number given in col 5 of Table 2

A-2.3 For endurance (*see 8.3*), the test shall be performed whenever there are changes in the design, materials, manufacture and construction. From the first lot after such a change takes place, 1 cistern at random shall be taken from those already found satisfactory in A-2.1 and A-2.2 in respect of all other requirements of this specification. If this sample cistern passes the endurance test the lot to which the sample belongs and all the subsequent lots manufactured under the same conditions of design, materials, manufacture and construction shall be deemed to conform to the endurance test till and change takes place

Table 2 Scale of Sampling and Criteria for Conformity

(Clauses A-2 1, A-2 1 1, A-2 2 and A-2 2 1)

Sl No	No of Cisterns in the Lot	For Material, Construction and Finish		For Operational and Performance Requirements	
		Sample Size	Acceptance No	Sub-sample Size	Acceptance No
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 50	8	0	5	0
ii)	51 to 100	13	0	8	0
iii)	101 to 150	20	1	13	0
iv)	151 to 300	32	1	20	1
v)	301 to 500	50	2	32	1
vi)	501 and above	80	3	50	2

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This Indian Standard has been developed from Doc No. CED 3 (6059)

Amendments Issued Since Publication

Amend No	Date of Issue	Text Affected

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