PRODUCT MANUAL FOR FLUSHING CISTERNS FOR WATER CLOSETS AND URINALS (OTHER THAN PLASTIC CISTERNS) ACCORDING TO IS 774: 2004

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

1.	**Product**	:	IS 774: 2004
	Title	:	Flushing Cisterns for Water Closets and Urinals (Other than Plastic Cisterns)
	No. of Amendments	:	2
2.	**Sampling Guidelines:**		
a)	**Raw material**	:	As per clause 4 and Table 1 of IS 774: 2004.
b)	**Grouping guidelines**	:	Flushing cistern of each type and discharge capacity shall be tested to cover that type of flushing cistern with the particular discharge capacity.
c)	**Sample Size**	:	(i) Flushing Cistern – 1 No (ii) Raw material test bar – 3 nos each for Tensile test and Traverse test
3.	**List of Test Equipment**	:	Please refer ANNEX – A
4.	**Scheme of Inspection and Testing**	:	Please refer ANNEX – B
5.	**Possible tests in a day**	:	Please refer ANNEX – C
6.	**Scope of the Licence:**		Please refer ANNEX – D

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ANNEX A

List of Test Equipment

Major test equipment required to test as per the Indian Standard

Sl. No.	Tests used in with Clause Reference	Test Equipment
1	Material (Clause.4 and Table 1)	
a)	For cast iron cistern (As per IS 210)	- Tensile Testing Machine along with attachments for carrying out Tensile Testing and Traverse Test - Vernier scale - Steel scale
b)	For Vitreous China Cistern [As per IS 2556 (Part 1)]	
	Material and manufacture- Water absorption [Clause 4 of IS 2556 (Part 1)] Water absorption [Clause 9.3 of IS 2556 (Part 1)]	- Hot air oven - Weighing balance - Pressure vessel - Hot plate - Distilled water - Smooth cloth
	Lead content in glaze material [Clause 5.2 of IS 2556 (Part 1)]	- Weighing balance - Hot air oven - Hydrochloric acid - Shaker machine
	Permissible blemishes and defects [Clause 6.4 of IS 2556 (Part 1)]	- Steel scale - Observation platform with requisite lighting arrangement as per clause 6.4 of IS 2556 (Part 1): 1994.
	Minimum thickness [Clause 7 of IS 2556 (Part 1)]	- Micrometer / Vernier calliper
	Warpage [Clause 9.1 of IS 2556 (Part 1)]	- Filler gauges
	Crazing [Clause 9.2 of IS 2556 (Part 1)]	- Autoclave vessel - Solution of dye - Wetting agent
	Modulus of rupture [Clause 9.4 of IS 2556 (Part 1)]	- Modulus of rupture test arrangement as per Clause 10.4.2 of IS 2556 (Part 1) : 1994
	Chemical resistance [Clause 9.5 of IS 2556 (Part 1)]	- Chemicals such as Acetic acid, Citric acid, Detergent, Hydrochloric acid, Sodium hydroxide, Sodium stearate, Sulphuric acid - Desiccator

	Resistance to staining and burning [Clause 9.6 of IS 2556 (Part 1)]	- Chemicals as per clause C-2.2 of IS 2556 (Part 1): 1994 - Distilled water' - Cloth - Cigarette
2	Construction (Clause 5)	- Vernier Callipers - Bevel Protractor - Thread Ring Gauge - Right Angle - Protractor with Spirit Level - Surface Table - Feeler Gauge - Goose neck Callipers - GO and NO-GO Gauges.
3	Working Water Level (Clause 7.2) Freedom from Self - Siphonage (Clause 7.3), Reduced water level (Clause 7.4)	- Vernier Callipers
4	Discharge capacity (Clause 7.5) Discharge rate (Clause 7.6)	- Stop watch - Measuring Jars
5	Endurance test (Clause8.3)	- Endurance Test Apparatus - Spirit Level

The above list is indicative only and may not be treated as exhaustive

ANNEX B

Scheme of Inspection and Testing

1. LABORATORY - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare a calibration plan for the test equipment.

2. TEST RECORDS – The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. LABELLING AND MARKING – As per requirements of IS 774: 2004

4. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1 shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

4.1 All the production which conforms to the Indian Standard and covered by the licence should be marked with Standard Mark.

5. REJECTIONS – Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.

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TABLE 1

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
4, Table1	**Material**						
i)	**Cistern**						
	Cast Iron	4, Table 1	IS 210	R			
	a) Tensile test		IS 210 IS 2078		One	Each melt	Please see Note 1
	b) Transverse test		IS 210		One	Each melt	This is optional test and may be carried out as per customer requirement.
	Vitreous china	4, Table 1	IS 2556 (Part 1)	Refer Table 2 of SIT			
	Enamelled pressed steel	4, Table 1	IS 513	-	-	-	Material shall be ISI marked.
	a) Pressed steel		IS 513	-	-	-	
	b) Vitreous enamelling		IS 1239 (Part 1)	-	-	-	
ii)	**Flush pipe**	4, Table 1	IS 774				
	Steel tube		IS 1239 (Part 1)	-	-	-	Material shall be ISI marked.
	Lead Pipe		IS 404 (Part 1)	S	One	Each consignment	No further testing is required if received with test certificate or ISI marked.
	Copper alloy tube		IS 407 IS 2501	S	One	Each consignment	
	High density polyethylene pipe		IS 774	S	One	Each consignment	
	Un-plasticized PVC pipe		IS 774	S	One	Each consignment	

iii)	Cover	4, Table 1	IS 774	Same as (i) above			
iv)	Chain	4, Table 1	IS 774	S	One	Each consignment	No further testing is required if received with test certificate or ISI marked.
v)	Overflow pipe	4, Table 1	IS 774	S	One	Each consignment	
vi)	**a) Siphon**	4, Table 1	IS 774				
	Cast iron		IS 210	Same as (i) above			
	Vitreous china		IS 2556 (Part 1)				
	b) Siphon/valve	4, Table 1	IS 774 IS 7328 IS 2267	S	One	Each consignment	No further testing is required if received with test certificate or ISI marked.
vii)	Lever	4, Table 1	IS 774 IS 210	Same as (i) above			
viii)	Float valve	4, Table 1	IS 1703 IS 12234 IS 13049	Please see Note 2			
ix)	Polyethylene float for float valve	4, Table 1	IS 9762				
x)	Bolts and nuts	4, Table 1	IS 774	S	One	Each consignment	No further testing is required if received with test certificate or ISI marked.
xi)	Coupling nut and lock-nut	4, Table 1	IS 774	S	One	Each consignment	
5	Construction	5.1 to 5.8	IS 774	R	Each cistern	-	-
6	Finish	6	IS 774	R	Each cistern	-	-
7	**Operational and Performance Requirements**						
7.1	Flushing arrangement	7.1	IS 774	R	Each cistern	-	-

7.2	Working water level	7.2	IS 774	R	10 % of Cisterns manufactured in a day		If a cistern fails in any one of these requirements, all the cisterns manufactured on that day shall be tested for all requirements and only passing cisterns shall be marked.
7.3	Freedom from Self-Siphonage	7.3	IS 774	R			
7.4	Reduced Water Level	7.4	IS 774	R			
7.5	Discharge Capacity	7.5, 8.1	IS 774	R			
7.6	Discharge Rate	7.6, 8.2	IS 774	R			
8.3	Endurance Test	8.3	IS 774	S	One	Once in a year	Additional sample shall be tested whenever there is changes in design, material of manufacture or construction (See Note 3)

Note 1: For tensile and transverse test for each continuous melt, three tensile test bars and three transverse test bars shall be cast separately. One tensile and one transverse test bar shall be subjected to tensile and transverse test respectively. If the results are within the specified limits these results shall be recorded representing the melt. If the bars do not conform, the two remaining test bars for each test shall be subjected to tensile and transverse test. If any of them fails, the casting representing this melt shall be rejected.

Note 2: Float valve

a) No testing is necessary if float valves carry Standard Mark. The record of purchase, batch numbers and its usage shall be kept.

b) In case float valves and floats are manufactured by the firm in the same premises, the tests as indicated in Table 3/Table 4/Table 5/Table 6 (as applicable) shall be carried out on whole production of float valves used in cisterns.

c) In case float valves are purchased from outside, the licensee shall ensure that these valves are made from material as specified. Each valve shall be examined for conformity to manufacture, workmanship, construction, hydrostatic test. Ten percent of the valves from each batch of valves received shall be tested for ensuring conformity to other clauses of IS 1703/ IS 12234/IS 13049 before accepting for use in cisterns. In case of any failure the batch shall be rejected.

- For IS 12234 valves, Antisiphonage test shall be conducted on one sample from every batch procured and endurance test shall be conducted once in six months and whenever there is change of source.

- For IS 13049 valves, Antisiphonage test shall be conducted on one sample from every batch procured, deflection test for assembly and endurance test shall be conducted once in a month and whenever there is change of source. For flush pipe, lever, chain over-flow pipe, bolts and nuts the firm shall maintain test certificates or test them inhouse for ensuring conformity to the requirements of the specification.

Note 3 – Approval of BIS shall be taken before marking any cistern with changed design, material manufacture & construction.

Note-4: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-5: Levels of control given in column 3 are only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification for approval by BO Head.

TABLE-2

VITREOUS CHINA CISTERNS: AS PER IS 2556 (PART 1)

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
4	Material and manufacture	4	IS 2556 (Part 1)	S	One	Each Lot	Once in three months or whenever there is change in source of material
5.1	Glazing	5.1	IS 2556 (Part 1)	R	Every cistern	-	-
5.2	Lead Content (in case of glazes containing lead)	5.2, Annex-A	IS 2556 (Part 1)	R	One	One mix of glazing material	
6	Permissible blemishes or defects	6	IS 2556 (Part 1)		Every cistern		
7	Minimum thickness	7	IS 2556 (Part 1)	R	One	Every trolley load after firing	One sample of each type shall be tested.
10.1	Warpage	10.1	IS 2556 (Part 1)	R	Every cistern		
10.2	Crazing *	10.2	IS 2556 (Part 1)	R	Three Sample pieces	Twice a week	In case of failure in any one of the requirements, the material representing that day's production shall not be marked and immediate corrective measures shall be initiated. Marking shall be resumed only when tests carried out on further sample for that requirement are found satisfactory.
10.3	Water Absorption*	10.3	IS 2556 (Part 1)	R	Three	Daily	
10.4	Modulus of rupture *	10.4	IS 2556 (Part 1)	R	Ten sample bars	Twice in week	
9.5	Test for Chemical Resistance *	9.5, Annex B	IS 2556 (Part 1)	R	Eight Sample pieces	Once in a week	
9.6	Test for resistance to staining and burning *	9.6, Annex C	IS 2556 (Part 1)	R	Two sample pieces	Once a week	

* For crazing, water absorption, test for chemical resistance, modulus of rupture and test for resistance to staining & burning test pieces may be separately made using the same body and glazed materials as used in making the cistern and put throughout the kiln along with the same cistern.

TABLE 3

WATER FITTINGS - COPPER ALLOY FLOAT VALVES (HORIZONTAL PLUNGR TYPE) AS PER IS 1703: 2000

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods			No. of Sample	Frequency	Remarks
		Clause	Reference				
5, Table 1	**Material**						
i)	**Body and parts of fittings (except lever or rod and back nut):** a) Cast brass b) Leaded Tin Bronze	5.1, Table 1	IS 1703 IS 292 IS 1264 IS 318	S	One	Each cast	@
	Physical Test			S	Three	Every tenth or fifth melt manufactured (See remarks)	
	Chemical Composition			S	Three		
ii)	**Lever rod:** Brass rod	5.1, Table 1	IS 1703 IS 319 IS 8364 IS 320 IS 6912		One	Each consignment	S
iii)	**Back nut and nuts for inlet pipe** a) Brass b) Leaded tin bronze	5.1, Table 1	IS 1703 IS 320 IS 1264 IS 292 IS 318	S	One	Each consignment	Further testing is not required, if received with test certificate or ISI marked. In case of cast or die cast brass, testing as per (i) above to be carried out.
iv)	**Washer:** Synthetic rubber	5.1, Table 1	IS 1703 IS 4346	S	One	Each consignment	No further testing is required if received with test certificate.
v)	**Inlet pipe:** Brass	5.1, Table 1	IS 1703 IS 407	S	One	Each consignment	

6	Manufacture and workmanship	6.1, 6.2	IS 1703	-	Each valve	-	-
7	Construction	7.2,	IS 1703	R	Each valve	-	-
7.4	Dimensions of body	7.4, Fig 2 Table 2(a), Table 2(b), Table 3(a), Table 3(b)	IS 1703	R	One valve	Every hour for each type of valve produced	In case of failure, entire production during that hour shall be tested and only conforming components shall be accepted.
7.5	Screw threads	7.5	IS 1703 IS 2643 (Part 3) IS 4218 (Part 1 to 6)	R	One valve	Every hour for each type of valve produced	
7.6	Piston	7.6, Table 4(a), Table 4(b)	IS 1703	R	One valve	Every hour for each type of valve produced	
7.7	Levers	7.7.1, 7.7.2, 7.7.3, 7.7.4, 7.7.5, 7.7.6, 7.7.7 Table 5(a), Table 5(b)	IS 1703 IS 9762	R	One valve	Every hour for each type of valve produced	
7.8	Washer	7.8, Table 4(a), Table 4(b)	IS 1703	R	One valve	Every hour for each type of valve produced	
7.9	Silencing pipes and anti-siphonage provision	7.9.1, 7.9.2	IS 1703	R	Each		Arrangement for installing silencing pipe may be made as per requirements of the purchaser.
7.10	Floats	7.10	IS 1703 IS 9762	S	One	Each consignment	No further testing is required if received with test certificate or ISI marked.
7.11	Back nut	7.11, Table 6	IS 1703 IS 2643 (Part 3)	R	One	From each hour production for each type of valve	In case of failure, entire production during that hour shall be tested and only conforming components shall be accepted.

8	**Testing**						
8.1	Hydraulic test	8.1	IS 1703	R	Each Valve	-	-
8.2	Shutting off test	8.2	IS 1703	R	One	Every tenth valve assembled	-
8.3	Test for mechanical strength of lever	8.3, Table 7	IS 1703	R	One	Every tenth valve assembled	-

@ Frequency of testing shall be one sample for each melt of 1000 kg or part thereof for first three melts. After that one sample shall be tested from every tenth melt, if manufactured from tested ingots/billets else one sample from every fifth melt shall be tested. On failure of any sample, every melt shall be tested till three consecutive samples pass.

TABLE 4

DIAPHRAGM TYPE (PLASTIC BODY) FLOAT OPERATED VALVES FOR COLD WATER SERVICES AS PER IS 13049: 1991

(1)				(2)	(3)		
Test Details				**Test equipment requirement R: required (or) S: Sub-contracting permitted**	**Levels of Control**		
Cl No	Requirement	**Test Method**			**No. of Sample**	**Frequency**	**Remarks**
		Clause	**Reference**				
5	Materials	5.1, 5.2, 5.3, Table 1 and 6.2	IS 13049	-	One	Each consignment received	No further testing is required if received with test certificate.
6	Manufacture and workmanship	6.1	IS 13049	-	Each valve	-	-
7	**Construction**						
	Inlet connection	7.1, Annex- A	IS 13049	R	Each valve	-	-
	Seats and Body	7.2.1, 7.2.2	IS 13049	-	Each valve	-	-
		7.2.3	IS 13049	R	Two	Each control unit ##	-
	Diaphragm	7.3	IS 13049	R	Each valve	-	-
	Backnuts	7.4, Annex-A	IS 13049	R	Each valve	-	-
	Floats	7.5.1 6	IS 13049 IS 9762	S	One	Each consignment received/ Each shift production	No further testing is required if received with test certificate or ISI marked
	Float arm and Assembly	7.5.2, 7.5.3, Annex- B	IS 13049	R	One	1000 valves or part thereof manufactured from same material received in a consignment	In case of failure marking shall be stopped immediately, cause of failure investigated, and appropriate corrective action taken and verified before resuming marking.

	Discharge arrangements	7.6.1, 7.6.2, 7.6.3	IS 13049	R	Each valve	-	-
8	**Performance Test**						
8.1	Hydraulic test	8.1	IS 13049	R	Three	Each control unit ##	-
8.2	Shut-Off test	8.2, Annex- C	IS 13049	R	Three	Each control unit ##	-
8.3	Anti-siphonage test	8.3, Annex - D	IS 13049	S	One	Once in a month	These tests are categorized as type tests. @@
8.4	Flow test	8.4, Annex- E	IS 13049	R	Three	Each control unit ##	-
8.5	Endurance test	8.5, Annex- F	IS 13049	S	One	Once in a month	These tests are categorized as type tests. @@
8.6	Test for hydraulic pressure on discharge arrangement	8.6, Annex- G	IS 13049	R	Three	Each control unit ##	-

@@ In case of failure of sample in these tests, marking shall be stopped and corrective action shall be taken. Marking shall be resumed only if improved sample is found conforming to all requirements. These tests shall also be conducted whenever there is change in material, construction or manufacturing process.

Note: Control unit for the valves defined as all valves of the same type manufactured from same material under similar conditions of manufacturing in a shift of maximum eight hours

TABLE 5

PLASTIC EQUILIBRIUM FLOAT VALVES FOR COLD WATER SERVICES AS PER IS 12234: 1988

(1)				(2)	(3)		
Test Details				**Test equipment requirement R: required (or) S: Sub-contracting permitted**	**Levels of Control**		
Cl No	Requirement	**Test Method**			**No. of Sample**	**Frequency**	**Remarks**
		Clause	**Reference**				
4	Materials	4	IS 12234	-	-	Each consignment	Conformity shall be ensured
5	Manufacture and workmanship	5.1	IS 12234	R	Each valve	-	-
		5.2	IS 12234	-	-	Each consignment	Conformity shall be ensured
6	Construction	6.1 to 6.3, 6.6 to 6.9	IS 12234	R	Each valve	-	-
	Dimension, Screw threads and Back nut	6.4.6.5 and 6.10	IS 12234	R	One	Each hour production for each type of valve	
7.1	Hydraulic and Shut-Off test	7.1.1, 7.1.2	IS 12234	R	One	Each control unit	-
7.2	Antisiphonage test	Appendix-A	IS 12234	R	One	Once in a month	-
7.3	Flow test	Appendix-B	IS 12234	R	One	Each control unit	-
7.4	Endurance test	Appendix-C	IS 12234	S	One	Once in six months	-

Note: Control unit for the product is defined as float valves of same type manufactured from same material under similar conditions of manufacturing in a day.

TABLE 6

POLYETHYLENE FLOATS (SPHERICAL) FOR FLOAT VALVES AS PER IS 9762: 1994

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
4	Material	4	IS 9672 IS 7328	S	One	Each Consignment	No further testing is required if received with test certificate or ISI marked.
6	**Dimensions**						
6.1	Diameter of float	6.1, Table 1	IS 9762	R	One	One-hour production from each machine	-
6.2	Wall Thickness	6.2.1, Table 1	IS 9762	R	One	One-hour production from each machine	-
	Wall thickness of boss – Thickness of metal inserted	6.2.2, 7.1, 7.3, Table 1	IS 9762	R	Thirteen	Each control unit	Thirteen samples of each size from each consignment during each shift shall be checked for its conformity before releasing the material for actual production.
7	Manufacture and Workmanship	7.1	IS 9762	R	All floats	-	-
8.1	Leakage and Water Absorption Tests	8.1, Annex-A	IS 9762	R	One	Each Control Unit	-
8.2	Deflection Test	8.2, Annex-B	IS 9762	R	One	Each Control Unit	-
8.3	Impact Test	8.3	IS 9762	R	One	Each Control Unit	-
8.4	Boss Test	8.4, Annex-C	IS 9762	R	One	Each Control Unit	-

Note: Control unit for the product is defined as all floats of same designation i.e nominal size and pressure application manufactured under similar conditions of manufacturing in one shift.

ANNEX C

Possible Tests in a Day

(i) Construction (Clause 5)
(ii) Finish (Clause 6)
(iii) Flushing arrangement (Clause 7.1)
(iv) Working Water Level (Clause 7.2)
(v) Freedom from Self-Siphonage (Clause 7.3)
(vi) Reduced Water Level (Clause 7.4)
(vii) Discharge Capacity (Clause 7.5)
(viii) Discharge Rate (Clause 7.6)

ANNEX D

Scope of the Licence

"Licence is granted to use Standard Mark as per IS 774: 2004 with the following scope:	
Name of the product	Flushing Cisterns for Water Closets and Urinals (Other than Plastic Cisterns)
Type according to installation of cistern	High-Level flushing cistern/ Low-Level flushing cistern/ Coupled flushing cistern
Type of dual flushing	Siphonic dual flush cistern/Non-siphonic dual flush cistern
Capacity	Discharge capacity --- litre