भारतीय मानक ब्यूरो
(उपभोक्ता मामले, खाद्य एवं सार्वजनिक वितरण मंत्रालय, भारत सरकार)
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(Ministry of Consumer Affairs, Food & Public Distribution, Govt. of India)

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व्यापक परिचालन मसौदा

हमारा संदर्भ : सीईडी 03/टी-75 **16 अगस्त 2024**

तकनीकी समिति: स्वच्छता उपकरण एवं जल फिटिंग विषय समिति, सीईडी 03

प्राप्तकर्ता :

1. **सिविल अभियांत्रिकी विभाग परिषद, सीईडीसी के सभी सदस्य**
2. **स्वच्छता उपकरण एवं जल फिटिंग विषय समिति, सीईडी 03 और इसकी उपसमितियों के सभी सदस्य**
3. **रुचि रखने वाले अन्य निकाय।**

महोदय/महोदया,

निम्नलिखित मानक का मसौदा संलग्न हैं:

प्रलेख संख्या	शीर्षक
सीईडी 03(26381)WC	शौचकुण्डों और मूत्रालयों के लिए फ्लश वॉल्व/फ्लशॉमीटर और फिटिंग — विशिष्टि का भारतीय मानक मसौदा (*आईएस 9758 का पहला पुनरीक्षण*) *[आईसीएस 91.140.70]*

कृपया इस मसौदे का अवलोकन करें और अपनी सम्मतियाँ यह बताते हुए भेजे कि यह मसौदा प्रकाशित हो तो इन पर अमल करने में आपको व्यवसाय अथवा कारोबार में क्या कठिनाइयां आ सकती हैं।

सम्मतियाँ भेजने की अंतिम तिथि: 15 सितंबर 2024

सम्मति यदि कोई हो तो कृपया अधोहस्ताक्षरी को ई-मेल द्वारा ced003@bis.gov.in पर या उपरलिखित पते पर, संलग्न फोर्मेट में भेजें। सम्मतियाँ बीआईएस ई-गवर्नेंस पोर्टल, www.manakonline.in के माध्यम से ऑनलाइन भी भेजी जा सकती हैं।

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यह प्रालेख भारतीय मानक ब्यूरो की वेबसाइट www.bis.gov.in पर भी उपलब्ध हैं।

धन्यवाद।

भवदीय
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संलग्न: उपरलिखित

भारतीय मानक ब्यूरो
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WIDE CIRCULATION DRAFT

Our Reference: CED 03/T-75 **16 August 2024**

TECHNICAL COMMITTEE: Sanitary Appliances and Water Fittings Sectional Committee, CED 03

ADDRESSED TO:

1. All Members of Civil Engineering Division Council, CEDC
2. All Members of Sanitary Appliances and Water Fittings Sectional Committee, CED 03 and its Subcommittees
3. All others interested.

Dear Sir/Madam,

Please find enclosed the following draft:

Doc No.	Title
CED 03(26381)WC	Draft Indian Standard Flush Valve/Flushometer and Fittings for Water Closets and Urinals — Specification (*First Revision of IS 9758*) *[ICS: 91.140.70]*

Kindly examine the attached draft and forward your views stating any difficulties which you are likely to experience in your business or profession, if this is finally adopted as National Standard.

Last Date for comments: 15 September 2024

Comments if any, may please be made in the enclosed format and emailed at ced003@bis.gov.in or sent at the above address. Additionally, comments may be sent online through the BIS e-governance portal, www.manakonline.in.

In case no comments are received or comments received are of editorial nature, kindly permit us to presume your approval for the above document as finalized. However, in case comments, technical in nature are received, then it may be finalized either in consultation with the Chairman, Sectional Committee or referred to the Sectional Committee for further necessary action if so desired by the Chairman, Sectional Committee.

The document is also hosted on BIS website www.bis.gov.in.

Thanking you,

Yours faithfully,
Sd/-
Dwaipayan Bhadra
Scientist 'E' & Head
Civil Engineering Department
Email: ced003@bis.gov.in
Phone: +91-11 2323 5529

Encl: As above

FORMAT FOR SENDING COMMENTS ON THE DOCUMENT

[Please use A4 size sheet of paper only and type within fields indicated. Comments on each clause/sub-clause/ table/figure, etc, be stated on a fresh row. Information/comments should include reasons for comments, technical references and suggestions for modified wordings of the clause. **Comments through e-mail to ced003@bis.gov.in shall be appreciated**.]

Doc. No.: CED 03(26381)WC **BIS Letter Ref**: CED 03/T-75

Title: Draft Indian Standard Flush Valve/Flushometer and Fittings for Water Closets and Urinals — Specification (*First Revision of IS 9758*)

Last date of comments: **15 September 2024**

Name of the Commentator/ Organization: _____

Sl No.	Clause/ Para/ Table/ Figure No. commented	Type of Comment (General/ Technical/ Editorial)	Comments/ Modified Wordings	Justification of Proposed Change
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NOTE- Kindly insert more rows as necessary for each clause/table, etc

BUREAU OF INDIAN STANDARDS

DRAFT STANDARD FOR COMMENTS ONLY

(Not to be reproduced without the permission of BIS or used as an Indian Standard)

Draft Indian Standard

FLUSH VALVE/FLUSHOMETER AND FITTINGS FOR WATER CLOSETS AND URINALS — SPECIFICATION

(*First Revision of IS 9758*)

Sanitary Appliances and Water Fittings Sectional Committee, CED 03	**Last Date for Comments: 15 September 2024**

FOREWORD

(*Formal clauses shall be added later*)

Flush valves are used for flushing of water closets, squatting pans, and urinals by directly connecting to pressure water pipes. When flush valves are operated, they allow a limited quantity of water for flushing and slowly close automatically. They are normally fixed at one meter height from the flooring of wash down water closets and one meter height from footrests in the case of squatting pans. This standard has been prepared with a view to laying down the nominal sizes, materials, and performance requirements of flush valves.

This standard was first published in 1981. This first revision has been prepared to incorporate present best practices being followed by the industry. In this revision, the following changes have been incorporated:

a) Flush valves can also be synonymous with flushometers which control the discharge of water and maintains the same volume from 0.14 MPa to 0.55 MPa operational pressure.
b) Concealed flushometers/ flush valves have been incorporated.
c) The water-efficient rating system has been incorporated to optimise the utilisation of water and minimise wastage.
d) 5/10 litres discharge capacities of flush valves have been deleted and replaced with 2/4, 2.5/4.8, 3/6 litre per flush (lpf) flush volumes for water closets.
e) 0.5 lpf, 1 lpf, and 1.5 lpf capacities have been incorporated for urinals.
f) Flush valves can be single or dual flush and shall have similar water efficiency requirements as the flushing cisterns/water closets.
g) Electroplating on the flush valve faceplate/trims and buttons changed to service condition 3 to service condition 2.
h) Performance requirements and test methods have been made more elaborative.
j) Test requirements for manual and sensor flush valve have been added for

better performance analysis.

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 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

BUREAU OF INDIAN STANDARDS

DRAFT STANDARD FOR COMMENTS ONLY

(Not to be reproduced without the permission of BIS or used as an Indian Standard)

Draft Indian Standard

FLUSH VALVE/FLUSHOMETER AND FITTINGS FOR WATER CLOSETS AND URINALS — SPECIFICATION

(*First Revision of IS 9758*)

1 SCOPE

This standard cover requirements for flush valves/flushometers — manual and sensor, both exposed and concealed, including flush pipes and stop valves for water closets and urinals.

2 REFERENCES

The standards listed in Annex A 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 agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards.

3 TERMINOLOGY

For the purpose of this standard the following definition shall apply:

3.1 Flush Valve/Flushometer — Flush valves/flushometer are fittings that are directly connected to pressure water pipes. When operated, they allow a pre-defined quantity of water to flush water closets and urinals, and then slowly close automatically.

3.2 Flush Valve/Flushometer Body — A fitting that contains a flush valve seat, body, and plate with a provision for mounting to a fixture. The means for mounting the body can be:

a) threaded or non-threaded; and
b) with or without an overflow.

3.3 Flush Valve/Flushometer Seal — A component of the flush valve that mates against the flush valve seat to prevent leakage when the flush valve is closed. Flappers are a type of flush valve seal.

3.4 Flush Valve/ Flushometer Seat — The sealing surface of the flush valve body which, when mated with the flush valve seal, prevents leakage through the flush valve into the fixture.

3.5 Mounting Seal — A seal between the flush valve body and the fixture.

3.6 Spud — A fitting used to connect a flushometer valve to a water closet or urinal.

3.7 Fittings – Fitting for the purpose of this standard are those accessories, which are adjacent to the flush valve and necessary to install it.

3.8 Dual Flush — 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 (*see* IS 774).

3.9 Service Condition — Depending upon the customer, there are four or five service conditions which define the environment to which the plated part may be exposed as a function of the substrate. (*see* IS 1068)

3.10 Service Condition 2 — Moderate category for the exposure indoors in places where condensation of moisture may occur. For example, in kitchens and bathrooms. (*see* IS 1068)

3.11 Electroplating Requirements — The recommended standards for electroplating coating of quality nickel/chromium on steel, iron, zinc, copper, and copper alloys for typical application at various places on different appliances for several purposes, which defines the minimum thickness of electroplating in micrometres.

3.12 Accessibility — Accessibility can be defined as a feature of “ability to access” that comprise of the terms “ease of access” for the user point of view. The product shall be accessible at minimum accessible pressure, by which a minor, aged or disabled persons can use it with the minimum efforts.

3.13 Piston Valve — The piston valve is made up of a moulded cup that separates the upper and lower chambers in the flushometer. The sliding motion within the valve body, cylinder thrusts the water down when flushed. However, this movement is longer than the flexing movement of the diaphragm.

3.14 Discharge Capacity — Discharge capacity is the total amount of water that a flush valve may release, when necessary to give a flush, which can be measured in litres per half/full flush in case of water closet and full flush in case of urinal, with the tolerance of given range.

3.15 Discharge Rate — The Discharge rate is the amount of water dispensed in definite time period, where the total dispensing volume shall not vary beyond the tolerance range.

3.16 Flow Rate — The flow rate is the amount of water that can be measured in litre per second/minute.

3.17 Actuator Plate — The actuator plate is the upper visible part of the concealed flush valve that a user can see and a plate where the actuation buttons are engraved to give a flush.

3.18 Flushing Pipe — A flushing pipe is a pipe used as a drain line in flushing that is installed to discharge into an open sewer system or into an area sloping towards an

open sewer system and to allow water to flow. Through which any loose, rust, mill scale, or construction debris can be removed from the system.

3.19 Working Pressure — A force that makes a flow of water strong or weak and exists in the pipeline, by which the water flows in the pipes of building, which may vary with the height increase or decrease of the building.

3.20 Hydraulic Pressure Test — A hydraulic pressure test is a way in which flush valve body or pipeline, or valve can be tested for strength and leaks.

3.21 Endurance Test — Endurance test is a test, which is performed to learn the number of operation cycles of the valve.

4 DESIGN REQUIREMENTS

4.1 Pressures

Flush valve/ flushometers shall be designed to function at a supply pressure between 140 kPa and 860 kPa. In addition, flush valve/ flushometers shall comply with **4.2**.

4.2 Temperatures

Flush valve/ flushometers shall be designed to function with water temperature between 4 °C and 40 °C.

4.3 Accessible Designs

Operating controls intended for use in accessible designs shall be automatically controlled; or meet the following requirements:

a) It shall be operable with one hand;
b) It shall not require tight grasping, pinching, or twisting of the wrist; and
c) It shall require an operating force not greater than 22 N.

4.4 Control Stop

If the manufacturer provides a control stop with the flush valve/ flushometer, it shall be considered part of the flush valve/ flushometer.

4.5 Discharge Capacity

4.5.1 Discharge capacities of flush valves/ flushometer and tolerances of the same shall be as under:

a) For water closets:

Flush Volume	*Tolerance*
6/3 litre	± 20 Percent
4/2 litre	

b) For urinals:

Flush Volume	*Tolerance*
1.5 litres	± 0.2 litres
1.0 litres	
0.5 litres	

4.6 Discharge Rate

When tested, flush valves/ flushometer shall discharge at an average rate between 72 lpm to 86 lpm.

5 MATERIAL

Materials used for the manufacture of component parts of flush valve shall comply with the requirements given in Table 1.

Table 1 Materials for Flush Valve/Flushometer, Flush Pipe and Stop Valve
(*Clause* 5)

Sl. No.	Component	Material	Indian Standard
(1)	(2)	(3)	(4)
i)	Body of flush valve/flushometer	a) Cast brass	LCB 2 of IS 292
		b) Die casting brass	IS 1264
ii)	Flush pipe	a) Steel tubes seamless or welded completely protected, inside and outside, either by vitreous enamelling or hot dip galvanizing	Designation ‘light’ of IS 1239 (Part 1)
		b) PVC	IS 4985 ‘Plumbing’
		c) High density polyethylene	IS 4984
		d) Lead	IS 404 (Part 1)
iii)	Washers	Rubber/silicon	IS 4346
iv)	Springs	a) Phosphor bronze	IS 7608
		b) Stainless steel	IS 4454 (Part 4)
v)	Stop valve	Cast brass	LCB 2 of IS 292
vi)	Spindle of stop valve, lever or flush valve	a) Extruded brass	IS 319
		b) Stainless steel	IS 4454 (Part 4)
		c) Plastic	IS 17077 (Part 1), IS 17077 (Part 2) and IS13360

Sl. No.	Component	Material	Indian Standard
(1)	(2)	(3)	(4)
vii)	Piston Assembly	Acetal copolymer (POM-Polyoxymethylene)	IS 7078 Appendix A Sl No 1 and IS13360
		Brass	IS 319
viii)	Actuator Plate	Zinc alloy	IS 713 : 1981
		ABS (acrylonitrile butadiene styrene)	IS 17077 (Part 1) and IS 17077 (Part 2) IS13360
		Brass	LCB 2 of IS 292
		Stainless steel	IS 4454 (Part 4)

6 MANUFACTURE AND CONSTRUCTION

6.1 Exposed Flush Valve/Flushometer

6.1.1 The flush valves/flushometer, used for water closets, of nominal sizes 20 mm, 25 mm, 32 mm, and 40 mm shall have an outlet of 32 mm and 40 mm outside diameter and shall have threads conforming to IS 2643.

6.1.2 The flush valves/flushometer, used for urinal, of nominal sizes 15 mm, 20 mm, and 25 mm shall have an outlet of 15 mm, 20 mm and 25 mm outside diameter respectively and shall have threads conforming to IS 2643.

6.1.3 The outlet of the valve shall be provided with a brass coupling nut, so that the flush valve may be connected to flushing pipes.

6.1.4 The flush valve/ flushometer shall be self-closing and non-concussive in action and shall be provided with a push button or lever for operation.

6.1.5 The stop valve having its principle of operation similar to that of a fancy stop valve shall be connected to the supply line. It shall be connected to the flush valve/ flushometer by a brass coupling.

6.1.6 A typical sketch of an exposed flush valve/ flushometer is shown in Fig. 1.

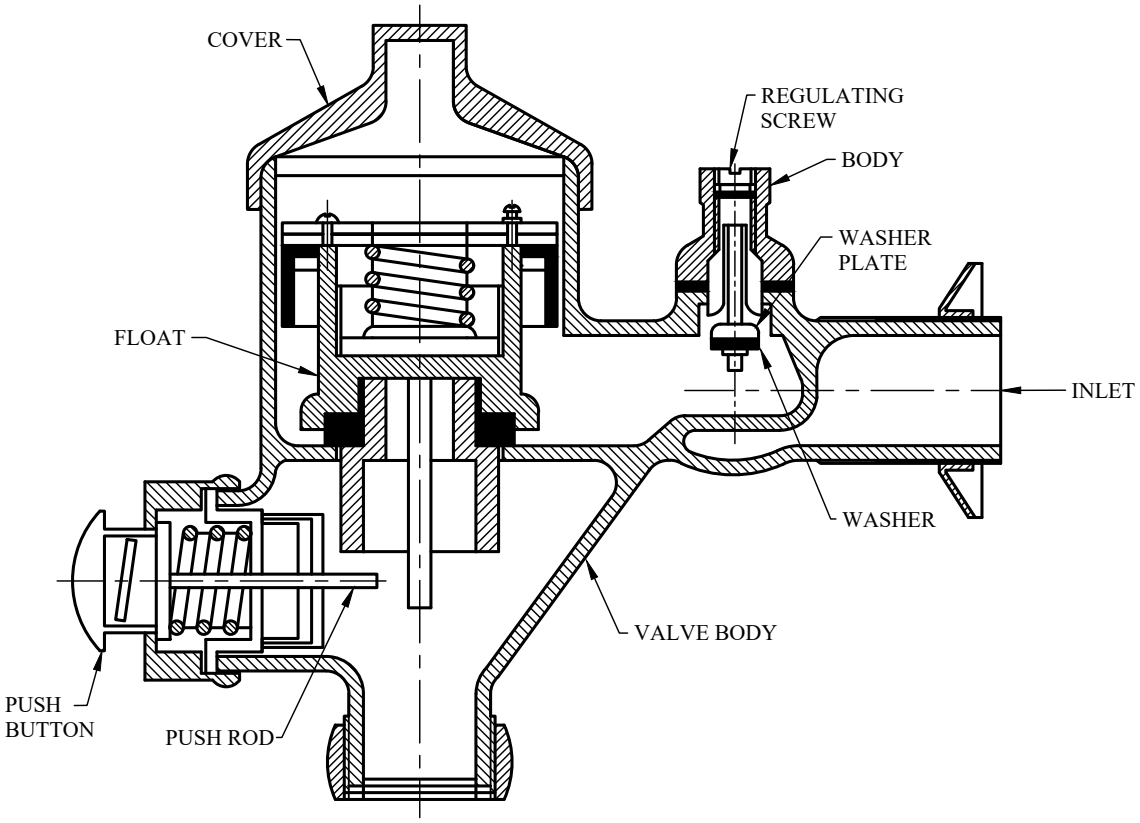


FIG. 1 TYPICAL SKETCH OF AN EXPOSED FLUSH VALVE/FLUSHOMETER

6.2 Concealed Flush Valve/Flushometer

6.2.1 The flush valves/flushometers shall be of nominal sizes conforming to **6.1.1** and **6.1.2**.

6.2.2 Flush valve/ flushometer shall have shutoff sleeve/ shut off mechanism to shut off water for maintenance and serviceability. A typical sketch of a concealed flush valve/flushometer is shown in Fig. 2.

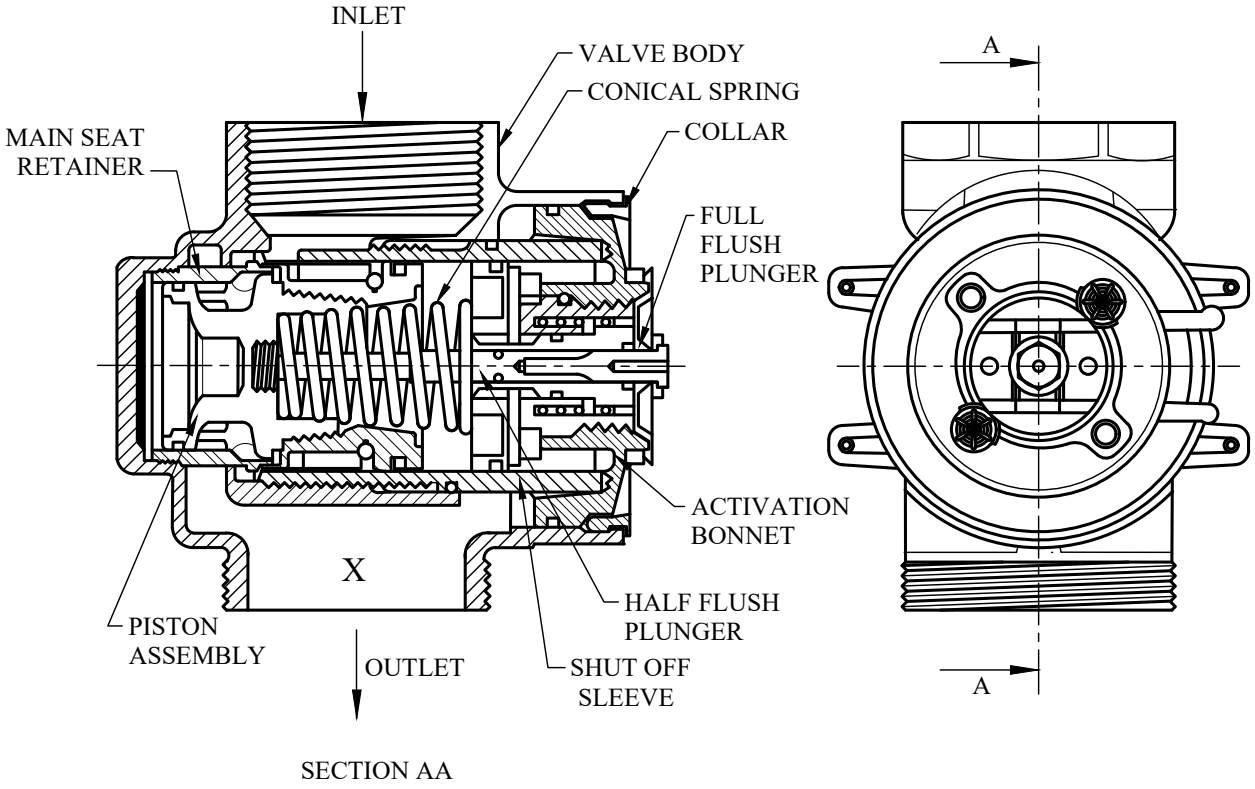


FIG. 2 TYPICAL SKETCH OF A FLUSH VALVE/FLUSHOMETER

7 PERFORMANCE REQUIREMENTS AND TEST METHODS

7.1 General

7.1.1 *Preconditioning*

Before testing, specimens shall be conditioned at ambient laboratory conditions for at least 12 h.

7.1.2 *Installation for Testing*

For test purposes, specimens shall be installed in accordance with the manufacturer's instructions. All intervals between discharges shall be sufficient so as to allow the flush valve/ flushometer to complete its flushing cycle.

7.1.3 *Test Conditions*

All tests shall be conducted using water temperatures between 4 °C and 30 °C, unless otherwise specified in the test procedure.

7.1.4 *Order of Tests*

Tests shall be conducted on the same specimen, in the order listed in this standard.

7.2 Pressure test

7.2.1 *Purpose*

The purpose of this test is to determine if the flush valve/ flushometer operates across its required pressure range.

7.2.2 *Procedure*

The pressure test shall be conducted as follows:

a) Install the test specimen on a test stand with the flush valve/ flushometer discharging to atmosphere.
b) Operate the flush valve/ flushometer (that is, allow it to complete its flushing cycle) at a static pressure of 140 kPa ± 14 kPa.
c) Repeat b) at a static pressure of 860 kPa ± 14 kPa.
d) Subject the flush valve/ flushometer to a static pressure of 140 kPa ± 14 kPa.
e) Hold for 5 min.
f) Repeat b) at a static pressure of 860 kPa ± 14 kPa.
g) Observe for leakage.

7.2.3 *Performance Criteria*

Failure to complete the flushing cycle or any leakage shall result in a rejection of the flush valve/ flushometer.

7.3 Hydraulic Performance Tests

7.3.1 *Purpose*

The purpose of this test is to determine the flush valve/ flushometer's hydraulic performance.

7.3.2 *Procedure*

The hydraulic performance test shall be conducted:

a) in accordance with the applicable performance tests specified in IS 2556 (Part 2), IS 2556 (Part 3), IS 2556 (Part 15) and IS 2556 (Part 16), for single-flush flush valve/ flushometers.
b) in accordance with the applicable performance tests specified in IS 17650 (Part 1), for dual-flush flush valve/flushometers.
c) using three fixtures
    i) complying with IS 2556 (Part 1), IS 2556 (Part 2), IS 2556 (Part 3), IS 2556 (Part 15) and IS 2556 (Part 16) or IS 17650 (Part 1)
    ii) manufactured by different manufacturers; and
d) following the sequence specified in Table 2 for each type of flush valve/ flushometer, depending on the fixture on which it is intended to be installed.

Table 2 Sequence for Hydraulic Performance Tests
(*Clause* 7.3.2)

Sl No.	Water Closet Flush Valve/ Flushometers	Urinal Flush Valve/ Flushometers	Dual Flush Valve/Flushometers	
			Full Flush Mode	Reduced Flush Mode
(1)	(2)	(3)	(4)	(5)
i)	Trap seal depth determination	Trap seal depth determination	Trap seal depth determination	Trap seal restoration
ii)	Water consumption	Surface wash	Water consumption	Reduced flush volume
iii)	Granule and ball	Dye	Granule and ball	Dye
iv)	Surface wash	Water consumption	Surface wash	Toilet paper
v)	Waste extraction	-	Waste extraction	-
vi)	Drain line transport characterisation	-	Drain line transport characterization	-

7.3.3 *Performance criteria*

Failure to comply with the performance requirements of IS 2556 (Part 2), IS 2556 (Part 3), IS 2556 (Part 15) and IS 2556 (Part 16) or, for dual flush function flush valve/ flushometers, IS 17650 (Part 1), shall result in a rejection of the flush valve/ flushometer.

7.4 Operating Requirements

7.4.1 *Purpose*

The purpose of this test is to determine the torque or force required to open, operate, and close a manually activated primary control.

7.4.2 *Procedure*

The operating (torque) test shall be conducted in an ambient environment of 27 °C ± 5 °C, as follows:

a) Install the test specimen on a test stand with the flush valve/ flushometer discharging to atmosphere.
b) Bring the test specimen to equilibrium test temperatures by running water through it.
c) Determine the torque or force to operate a manually activated operating control by testing with water running as follows:
   i) 140 kPa ± 14 kPa at 27 ± 5 °C; and
   ii) 550 kPa ± 14 kPa at 27 ± 5 °C.

7.4.3 *Performance criteria*

7.4.3.1 For primary controls of non-accessible design flush valve/ flushometers, the linear force shall not exceed 90 N.

7.4.3.2 For primary controls of accessible design flush valve/ flushometers, the linear force shall not exceed 22 N.

7.5 Life Cycle Test

7.5.1 *Purpose*

The purpose of this test is to determine if there is any deterioration in the performance of the flush valve/ flushometer through the life cycle testing.

7.5.2 *Procedure*

7.5.2.1 *Test set-up*

The flush valve/ flushometer for the life cycle test shall be set up as follows:

a) Install the test specimen on a test stand with the flush valve/ flushometer discharging to atmosphere.
b) Connect the flush valve/ flushometer to a 172 kPa ± 14 kPa flowing supply pressure at 27 °C ± 5 °C.
c) Flush the flush valve/ flushometer at least five times to hydraulically balance it.
d) Once hydraulically balanced, flush the flush valve/ flushometer five consecutive times.
e) Measure the volume of each flush.
f) Average the five flush volumes and record the average flush volume of the flush valve/ flushometer. For dual flush valve/ flushometers, measure and average the flush volumes for five full flushes, then measure and average the flush volumes for five reduced flushes.

7.5.2.2 *Procedure for flush valve/ flushometers with a primary control only*

The life cycle test for flush valve/ flushometers with a primary control only shall be conducted as follows:

a) Subject the flush valve/ flushometer to 2 50 000 cycles of operation.
b) After every 25 000 cycles,
    i) record the average flush volume of three consecutive flushes; and
    ii) observe the flush valve/ flushometer for leakage.
c) For dual flush; flush valve/flushometers, use the following cycling sequence:
    i) 25 000 cycles in full-flush mode.
    ii) 1 00 000 cycles in reduced-flush mode.

d) Compare the average flush volumes at each stage with the average discharge volumes recorded in accordance with **7.5.2.1** f).

7.5.2.3 *Procedure for flush valve/ flushometers with an optional secondary control*

When the flush valve/ flushometer is equipped with a secondary control, the secondary control shall be subjected to 2 500 cycles of operation upon the completion of the test specified in **7.5.2.2**. At the end of the 2 500 cycles, the average flush volume of three consecutive flushes shall be recorded.

7.5.2.4 *Subsequent tests*

Upon completion of the test specified in **7.5.2.2** and, when applicable, in **7.5.2.3**, the following tests shall be conducted again:

a) Pressure test, for all flush valve/ flushometers (*see* **7.2**);
b) Operating requirements test, for the flush valve/flushometer (*see* **7.4**).

7.5.3 *Performance Criteria*

7.5.3.1 Sticking, chattering, or leaking during or at the conclusion of the life cycle test shall result in a rejection of the flush valve/ flushometer.

7.5.3.2 For flush volumes

a) greater than 2 litre, the average flush volume at each recorded stage varying by more than 20 percent shall result in a rejection of the device; and
b) 2 litre or less, the average flush volume at each recorded stage shall not vary by more than 20 percent.

7.5.3.3 Failure to meet the criteria specified in **4.1** and **4.3** at the completion of the life cycle test shall result in rejection of the flush valve/ flushometer.

7.6 Integral Control Stop Life Cycle Test

7.6.1 *Purpose*

The purpose of this test is to ensure that optional integral control stops are operable for a specified minimum number of cycles.

7.6.2 *Procedure*

The life cycle test for integral control stops for flush valve/ flushometers shall be conducted as follows:

a) Install the test specimen on a test stand with the flush valve/ flushometer discharging to atmosphere.
b) Position the integral control stop in the closed position.
c) Pressurise the control stop to 860 kPa ± 35 kPa.
d) Check for leaks.

e) Reduce the pressure 415 kPa ± 20 kPa.

f) Operate the control stop for 500 cycles, as follows:

   i) One complete cycle shall be operating the control stop from the fully closed position to at least 80% of the fully open position, without making contact with the end stops, and back to the fully closed position.

   ii) The rate of opening and closing the control stop shall not exceed 250 cycles per hour to effectively simulate its manual operation.

g) Upon completion of the 500 cycles of operation,

   i) close the control stop;

   ii) pressurise the control stop to 860 kPa ± 35 kPa;

   iii) maintain the pressure for 5 min; and

   iv) check for leaks.

7.6.3 *Performance Criteria*

Any sign of leakage from the control stop shall result in a rejection of the flush valve/ flushometer.

7.7 Hydrostatic Pressure Test for Non-Tank Type Flush Valve/Flushometer

7.7.1 *Purpose*

The purpose of the hydrostatic pressure test for non-tank type flush valve/ flushometers is to determine if the flush valve/ flushometer is capable of withstanding a hydrostatic test pressure of 3 450 kPa.

7.7.2 *Procedure*

The hydrostatic pressure test for non-tank type flush valve/ flushometers shall be conducted as follows:

a) Close the flush valve/ flushometer.

b) Pressurise the flush valve/ flushometer to a hydrostatic pressure of 3 450 kPa ± 35 kPa through the inlet. Maintain the pressure for one min.

7.7.3 *Performance Criteria*

Any leakage shall result in a rejection of the flush valve/ flushometer.

7.8 Hydrostatic Pressure Test for Tank Type Flush Valve/Flushometers

7.8.1 *Purpose*

The purpose of the hydrostatic pressure test for tank type flush valve/ flushometers is to determine if the flush valve/ flushometer is capable of withstanding a hydrostatic test pressure of 3 450 kPa or two times the minimum relief valve opening pressure, but in no case less than 550 kPa.

7.8.2 *Procedure*

The hydrostatic pressure test for tank type flush valve/flushometer shall be conducted as follows:

a) Remove or deactivate relief valve for flush valve/flushometer that incorporate such devices.
b) Increase the pressure at the inlet by increments of 7 kPa per second, from 0 kPa until the relief valve is discharging at a flow rate of at least 5 ml/min.
c) Record the pressure in b) and name it as the minimum relief valve opening pressure.
d) Block the outlet of the relief valve.
e) Pressurise the flush valve/ flushometer to a hydrostatic pressure of two times the minimum relief valve opening pressure, but not less than 550 kPa.
f) Maintain the pressure for 5 min.
g) For flush valve/ flushometers without a relief valve, slowly increase the pressure to 3 450 kPa ± 35 kPa.
h) Maintain the pressure for one min.

7.8.3 *Performance Criteria*

Any leakage through the flush valve/ flushometer's body shall result in a rejection of the flush valve/ flushometer.

7.9 Coatings

7.9.1 *General*

The fittings selected for testing shall be as received from the manufacturer and shall not have been subjected to any other test. The significant surfaces of the coated components shall be free of surface defects and uncoated areas and shall not be stained.

7.9.2 *Corrosion (All Substrates and Coatings)*

7.9.2.1 *Performance requirements*

After undergoing the applicable test specified in **7.9.2.2.1**, coatings shall not show more than one surface defect in any 650 mm^2 area of the significant surface or up to three surface defects on a 25 mm length of parting line. The surface defects shall not be larger than 0.8 mm in any dimension.

If widely scattered surface defects are observed after testing (as occasionally occurs), such defects shall not significantly deface or adversely affect the function of the coated part.

7.9.2.2 *Test procedure*

7.9.2.2.1 The coated parts shall comply with the performance requirements of **7.9.2.1** after being subjected to one of the following corrosion tests:

a) IS 6910 (acetic acid) — The test duration shall be 8 h for service conditions 1 (SC-1) and 24 h for service conditions 2 (SC-2).
b) IS 9844 (neutral salt) — This test shall be applicable to SC-2 devices and shall have a duration of 24 h.
c) IS 5528 (CASS) — This test shall be applicable to SC-2 devices and shall have a duration of 4 h.
d) IS 8038 (Corrodkote) — This test shall be applicable to SC-2 devices and shall have a duration of 4 h.

NOTE — If more than one test method is specified, the manufacturer may specify which method is to be used. SC-1 and SC-2 are defined in IS 1068.

7.9.2.2.2 An SC-1 specimen that passes the SC-2 test shall be considered to have met the requirements of **7.9.2.2.1**.

7.9.3 Adhesion

7.9.3.1 *Performance requirements*

The coating and the separate layers of multi-layer coatings shall be sufficiently adherent to each other and to the base material to comply with one of the adhesion tests specified in **7.9.3.2** or **7.9.3.3**, as applicable.

7.9.3.2 *Electrodeposited and PVD coatings on metals*

Specimens shall be tested in accordance and comply with one of the following adhesion tests specified in IS 1068:

a) Annex H file test; and
b) Annex J quenching test.

7.9.3.3 *Electrodeposited and PVD coatings on plastics*

7.9.3.3.1 Performance requirements

Fittings or component parts of fittings that have electrodeposited coatings on plastic bases shall comply with the following requirements when tested in accordance with **7.9.3.3.2**:

a) No surface defects shall be present on significant surfaces.
b) Non-significant surfaces, gates, and parting lines may have minor cracks not longer than 6 mm, provided that there is no loss of adhesion between the base material and the coating.
c) Blisters not exceeding 6 mm^2 in area shall be acceptable within 6 mm of an injection point. If an injection point is within 6 mm of a significant surface, Item a) shall apply.
d) Warpage shall be considered acceptable only where it does not affect the performance of the fitting or component.

7.9.3.3.2 *Thermal cycling procedure*

Before the thermal cycling test begins, the fittings or component parts of fittings shall be examined and surface imperfections (e.g., small mould imperfections) shall be noted. These surface imperfections shall not be considered failures after the thermal cycling test unless they develop into surface defects. Under dry conditions, the specimens shall be subjected consecutively to four complete cycles of temperatures, with each complete cycle consisting of the following steps in the following order:

a) - 40 ± 2 °C for 20 min to 1 h;
b) 20 ± 5 °C for a minimum of 20 min;
c) 75 ± 2 °C for 20 min to 1 h; and
d) 20 ± 5 °C for a minimum of 20 min.

The temperatures specified in a) to d) shall be measured within 51 mm ± 0.25 mm of the centre of the location of the specimens. Temperature ramping may be used for achieving the temperatures specified in a) to d). For the steps specified in a) and c), the temperature ramping time (if any) plus the time during which the specimen is at the specified temperature (a minimum of 20 min) shall not exceed 1 h. During testing, there shall be free circulation of air around the specimens and most of their surface area shall not be in contact with other specimens or the holding container.

7.9.4 *Decorative Organic Coatings*

7.9.4.1 *Performance requirements*

Decorative organic coatings shall show no surface defects when they are tested in accordance with **7.9.4.2** and **7.9.4.3**, and their finish shall not erode in such a way that the surface directly beneath the organic coating is exposed when they are tested in accordance with **7.9.4.4**.

7.9.4.2 *Water degradation*

Specimens shall be immersed in distilled water maintained at 38 °C ± 1 °C for 24 h ± 0.5 h in a corrosion-proof container and then removed and examined.

7.9.4.3 *Soap and cleaner effects*

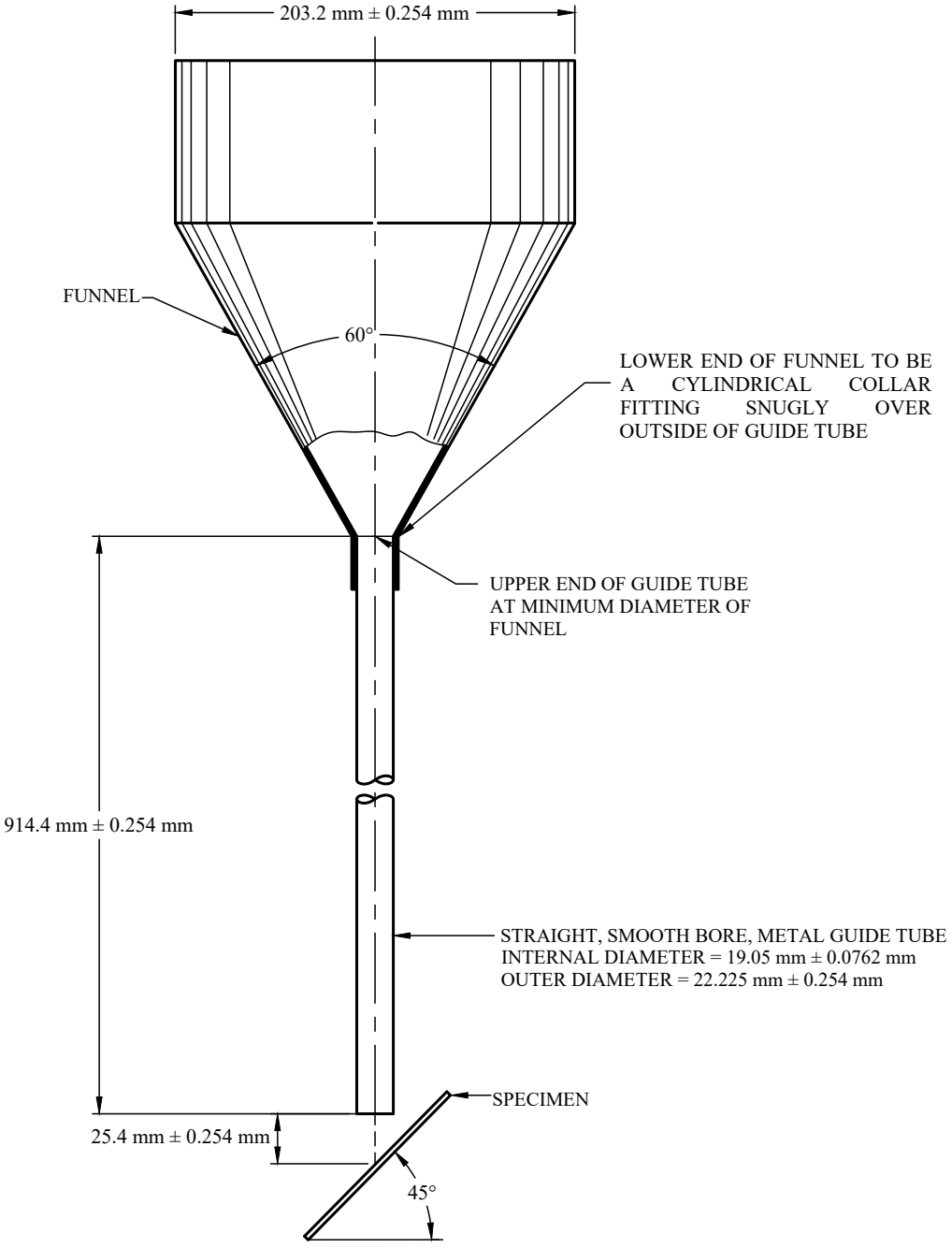
Two drops (0.10 ml total) of each of the following solutions shall be applied to the organic coating (preferably on a flat surface) and allowed to remain there for 16 h:

a) ammonium hydroxide (6N);
b) sodium hydroxide (6N);
c) methanol (100%); and
d) surfactant (100% polyethylene oxyethanol).

At the end of the 16 h period, the excess liquid shall be removed by rinsing with water, and the coating shall be dried and examined.

7.9.4.4 *Abrasion resistance*

Test specimens as shown in Fig. 3 using 12 litre of silica sand on a relatively flat surface of the specimen.



NOTE — Both ends of the guide tube to be cut squarely and all burrs to be removed.

FIG. 3 TESTING ARRANGEMENT FOR ABRASION RESISTANCE TEST

8 SUPPLY CONDITIONS

The manufacturer shall supply service instructions for maintenance and installation purposes.

9. SAMPLING AND CRITERIA FOR CONFORMITY

The sampling and criteria for conformity of a lot to the requirement of this specification shall be as per Annex B.

10. ADDITIONAL REQUIREMENTS FOR WATER EFFICIENCY

For water efficiency rating and labelling of wall mounted water closets, the requirements given in IS 17650 (Part 1) shall be complied with.

NOTE –– To achieve overall sustainability, it is strongly recommended that users opt for star rated flush valves. Manufacturers in turn are encouraged to commit to the cause by manufacturing only water efficient flush valves/flushometers.

11. MARKING

11.1 Each flush valve and its component parts shall be clearly and permanently marked with the following:

a) The manufacturer's name or trademark,
b) Nominal size of the flush valve.
c) Direction of the water with arrow.
d) Indicate inlet and outlet on the concealed body of the flush valve.
e) Indication of full and half flush on the push button actuator.
f) In case of replacement, packaging for flush valves and flush valve seals shall be marked with the above mentioned all points.

11.2 BIS Certification Markings

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the revolving branches may be marked with the Standard Mark.

ANNEX A
(*Clause* 2)

LIST OF REFERRED STANDARDS

IS No.	*Title*
292 : 1983	Leaded brass ingots and castings
319 : 2007	Free cutting brass bars, rods and section
404 (Part 1) : 1993	Lead pipes — Part 1: For other than chemical purposes
713 :1981	Zinc based alloy ingots die casting
774: 2021	Ceramic vitreous China flushing cisterns for water closets and urinals — Specification
1068: 1993	Electroplated coatings of nickel and chromium on copper and copper alloys
1239 (Part 1) : 2004	Steel tubes, tubulars and other wrought steel fittings — Part 1: Steel Tubes
1264 : 1997	Brass gravity die castings (ingots and Castings)
2556	Vitreous China sanitary appliances
(Part 1): 2021	General requirements (*fourth revision*)
(Part 2): 2024	Vitreous China sanitary appliances — Specification Part 2 Specific requirements of washdown water closets (*sixth revision*)
(Part 3): 2004	Specific Requirements of Squatting Pans (*fifth revision*)
(Part 15): 2024	Vitreous China sanitary appliances — Specification Part 15 Specific requirements of universal water closets (*third revision*)
(Part 16): 2024	Vitreous China sanitary appliances — Specification Part 16 Specific requirements of washdown wall mounted water closets (*first revision*)
2629 : 1989	Ferrules for water services
2643 : 2005	Pipe threads where pressure — tight joints are not made on the threads — dimensions, tolerances and designation (*third revision*)
4346 : 1982	Washers for use with fittings for water services
4454 (Part 4): 2001	Steel wires for mechanical springs — Part 4 : Stainless steel wire
4905 : 2015	Random sampling and randomization procedures (*first revision*)
4984 : 2016	Polyethylene pipes for water supply — Specification (*fifth revision*)

IS No.	*Title*
4985 : 2021	Unplasticized PVC pipes for potable water supplies specification (*fourth revision*)
5528: 1985	Method of testing corrosion resistance of electroplated & anodized aluminium coating by copper accelerated salt spray test
6910: 1985	Method of testing corrosion resistance of electroplated & anodized aluminium coating by acetic acid salt spray test
7078 : 1973	Plastics used in instruments industries, thermoplastic materials
7608 : 1987	Phosphor bronze wire for general engineering purposes
8038: 1985	Method of testing corrosion resistance of electroplated & anodized aluminium coating by corrodkote salt spray test
9844: 1981	Method of testing corrosion resistance of electroplated & anodized aluminium coating by neutral salt spray test
13360: 2016	Plastics - Methods of testing
17077 (Part 1): 2022	Plastics acrylonitrile-butadienestyrene abs moulding and extrusion materials Part 1 designation system and specifications
17077 (Part 2): 2020	Plastics acrylonitrile- butadiene-styrene (ABS) moulding and extrusion materials Part 2 preparation of test specimens and determination of properties
17650 (Part 1) : 2021	Water efficient plumbing products requirements — Part 1: Sanitaryware

ANNEX B
(*Clause* 9)

SAMPLING OF FLUSH VALVES FOR WATER CLOSETS AND URINALS

B-1 SAMPLING

B-1.1 Lot

B-1.1.1 In any consignment all the flush valves of the same nominal size, manufactured from similar materials under essentially uniform conditions of manufacture shall be grouped together to constitute a lot.

B-1.1.2 Samples shall be selected and tested from each lot separately to determine their conformity or otherwise to the requirements of this standard.

B-1.2 The number of flush valves to be selected from a lot for the sample shall depend upon the size of the lot and shall be in accordance with Table 3.

Table 3 Scale of Sampling and Permissible Number of Defectives

(*Clause* B-1.2 *and* B-3.1)

Sl No.	Lot Size	Sample Size (No. or Valves to Be Selected for the Sample)	Permissible No. or Defectives
(1)	(2)	(3)	(4)
i)	Up to 100	5	0
ii)	101 to 150	8	0
iii)	151 to 300	13	1
iv)	301 to 500	20	2
v)	501 to 1000	32	3
vi)	1001 and above	50	5

B-1.3 The valves for the sample shall be selected at random from the lot and to ensure the randomness of selection, procedures given in IS 4905 may be adopted.

B-2 NUMBER OF TESTS

B-2.1 All the valves selected in the sample shall be inspected for design requirements (*see* **4**), material (*see* **5**), and performance requirements (*see* **7**).

B-2.1.1 The valves failing to meet any one or more of the requirements tested for in **7** shall be considered as defective.

B-3 CRITERIA FOR CONFORMITY

B-3.1 A lot shall be considered having satisfied the requirements of this standard only if the number of defectives found in the sample does not exceed the permissible number of defectives given in Table 3.