

इंटरनेट

मानक

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IS 13049 (1991): diaphragm type (plastic body) float operated valves for cold water services [CED 3: Sanitary Appliances and Water Fittings]



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IS 13049 : 1991

Reaffirmed 2007

भारतीय मानक

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*Indian Standard*

DIAPHRAGM TYPE ( PLASTIC BODY) FLOAT  
OPERATED VALVES FOR COLD WATER  
SERVICES — SPECIFICATION

UDC 621 646 44 : 696.117

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

.March 1991

Price Group 4

**AMENDMENT NO. 1 NOVEMBER 2005  
TO  
IS 13049 : 1991 DIAPHRAGM TYPE (PLASTIC  
BODY) FLOAT OPERATED VALVES FOR COLD  
WATER SERVICES — SPECIFICATION**

( Page 2, clause 8.1, line 3 ) — Substitute 'Min 2 MPa' for '2 +0.025 MPa'  
-0

( CED 3 )

**AMENDMENT NO. 2 NOVEMBER 2011**  
**TO**  
**IS 13049 : 1991 DIAPHRAGM TYPE (PLASTIC BODY)**  
**FLOAT OPERATED VALVES FOR COLD WATER**  
**SERVICES — SPECIFICATION**

*(Page 6, Annex E)* — Substitute following for the existing:

**ANNEX E**

**FLOW TEST**

**E-1 LOW PRESSURE SEAT TEST**

**E-1.1 Apparatus**

**E-1.1.1** A test rig [*see* Fig. 4(a)] capable of maintaining  $1 \pm 0.1$  m head of water at the seat of the valve under test, comprising a cistern, connected through 15 mm copper pipe work to the specimen valve via a controlling gate valve.

**E-1.2 Procedure**

Fit the float operated valve (installed with the LP seat) to be tested together with its discharge arrangement. Remove the float. Cause the valve to discharge water from cistern *A* into container *B* [*see* Fig. 4(a)] for a period of  $140 \pm 5$  s whilst maintaining, for the duration of the test the water level in cistern *A* at a height of  $1 \pm 0.1$  m above the centre of the inlet of the valve.

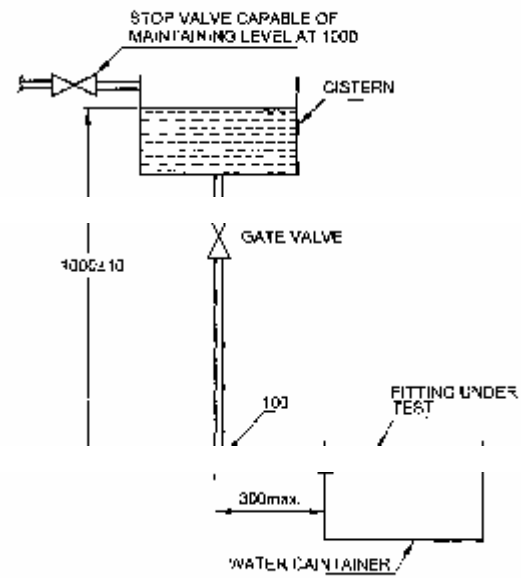
**E-1.3 Result**

Record the amount of water in container *B*.

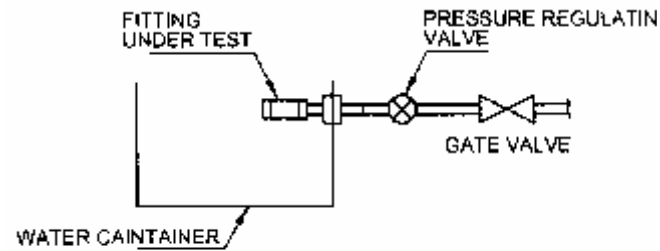
**E-2 HIGH PRESSURE SEAT TEST**

**E-2.1 Apparatus**

**E-2.1.1** A test rig [*see* Fig. 4(b)] capable of maintaining a constant pressure of  $0.35 \pm 0.01$  MPa the inlet of the valve under test, connected through 15 mm copper pipe work to the specimen valve via a controlling gate valve.



a) TYPICAL LOW PRESSURE SEAT MINIMUM FLOW TEST APPARATUS



b) TYPICAL HIGH PRESSURE SEAT MINIMUM FLOW TEST APPARATUS

All dimensions in millimetres.  
FIG. 4 FLOW TEST APPARATUS

**E-2.2 Procedure**

Fit the float operated valve (installed with HP seat) to be tested together with its discharge arrangement. Remove the float. Cause the valve to discharge water into container *B* for a period of  $140 \pm 5$  s whilst maintaining, for the duration of the test the constant pressure of  $0.35 \pm 0.01$  MPa at the seat.

**E-3 RESULT**

Record the amount of water in container *B*.



#### FOREWORD

This Indian Standard 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.

With a view to conserve the scarce metal and the ever increasing use of polymers at the national and international level in consumer goods, this standard in the series of other float operated valves, has been prepared.

It is based on the principle that the flow of water is controlled by the flexing of a diaphragm and which incorporates or is fitted with a discharge arrangement to conduct the water into the cistern. In the preparation of this standard, assistance has also been derived from BS 1212 ( Part 3 ) : 1979 'Float operated valves ( excluding float ) — Part 3 : Diaphragm type ( plastic body ) for cold water services', issued by the British Standards Institution.

In reporting the results of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values ( revised )'.

## Indian Standard

# DIAPHRAGM TYPE ( PLASTIC BODY ) FLOAT OPERATED VALVES FOR COLD WATER SERVICES — SPECIFICATION

### 1 SCOPE

This standard specifies materials, workmanship, performance and sampling, requirements besides where appropriate, dimensions and tolerances, of diaphragm type float operated valves for water services up to 45°C for use in flush tanks, overhead water tanks, etc.

### 2 REFERENCES

The following Indian Standards below are necessary adjuncts to this standard.

IS No.	Title
2643 ( Part 3 ) : 1975	Dimensions for pipe threads for fastening purposes: Part 3 Limits of sizes ( first revision )
4346 : 1982	Washers for use with fittings for water services ( first revision )
4905 : 1968	Methods for random sampling
9762 : 1981	Polyethylene floats for ball valves

### 3 DEFINITIONS

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

#### 3.1 Diaphragm Type Float Operated Valve

A float operated valve in which the flow of water is controlled by flexing of a diaphragm and which incorporates or is fitted with a discharge arrangement to conduct the water into the cistern.

#### 3.2 Effective Warning Water Level

The level when water reaches 10 mm above the invert of a side or bottom connection warning pipe in a flushing cistern ( see Fig. 1 ).

#### 4 NOMINAL SIZE

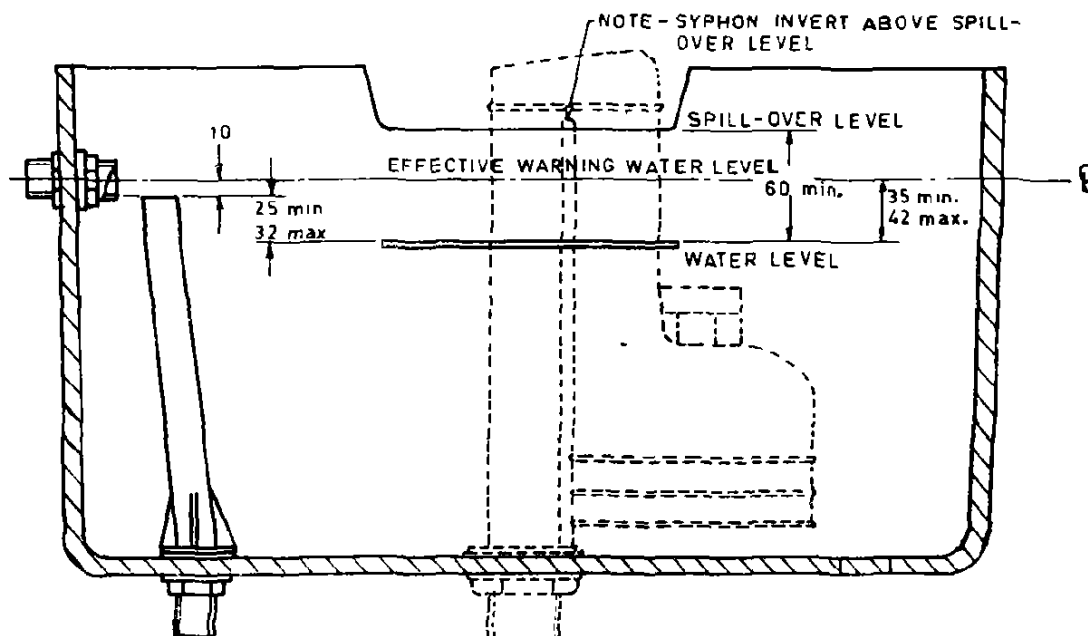
The nominal size of the float valve shall be 15 mm.

#### 5 MATERIALS

5.1 The component/parts shall be made of materials given in Table 1.

5.2 When choosing plastic materials manufacturer shall take due account of the characteristics required for satisfactory use, that is, mechanical, dimensional and chemical stability. Plastic selected shall not degrade under normal working conditions.

5.3 With the exception of valve seats and backplate plungers where no reworked material shall be used, the plastic parts of valves can be



All dimensions in millimetres.

FIG. 1 ILLUSTRATION OF EFFECTIVE WARNING WATER LEVEL IN RELATION TO OTHER COMMONLY DEFINED LEVELS IN A FLUSHING CISTERN

**Table 1 Materials for Body and Components  
Parts of Float Valves  
( Clause 5.1 )**

Sl No.	Components/Parts	Material
(1)	(2)	(3)
1.	Valve body, inlet shank, valve seat and back nut	Polyacetal
2.	Discharge horn ( if provided )	Polyacetal or polypropylene or polyethylene or Acrylonitrile Butadiene Styrene ( ABS ) or Ethylene Vinyl Acetate ( EVA ) or any other suitable material
3.	Diaphragm	Synthetic rubber

manufactured, if required, with the addition of not more than 15 percent of the manufacturer's own clean reworked plastic material resulting from the manufacturing process. No other reworked material shall be used.

## 6 MANUFACTURE AND WORKMANSHIP

**6.1** Parts shall be sound in all respects and free from defects such as flash, plugging, etc, which may arise during manufacture.

**6.2** The materials used for manufacturing the parts of the valves when in contact with the water shall not constitute a toxic hazard and shall not foster microbiological growth or impart any unpleasant taste, odour, cloudiness and discoloration to the water.

## 7 CONSTRUCTION

### 7.1 Inlet Connection

The inlet shank shall be not less than 48 mm in length. External screw on inlet connections shall be such as to meet the test requirements of Annex A.

### 7.2 Seats and Body

**7.2.1** The valves shall be supplied with a high pressure ( HP ) or a low pressure ( LP ) seat.

NOTE — The HP seat is intended for use with water pressure above 0.35 MPa and up to 1.05 MPa and the LP seat for water pressure of 0.35 MPa and below.

**7.2.2** In case of detachable type of seats, colour coding as given below shall be followed.

Colour	Type of Seat
Red	High Pressure ( HP )
White	Low Pressure ( LP )

**7.2.3** The distance between the seat outlet orifice and the shutting off face of the diaphragm shall be 1.5 mm, *Min* in the fully opened position.

### 7.3 Diaphragm

Diaphragms made of synthetic rubber shall have the form and dimensions as required for the operation of the valve.

### 7.4 Backnuts

The inlet shank of every valve shall be provided with two backnuts with parallel internal threads conforming to IS 2643 ( Part 3 ) : 1975 and of the same size as float valves. Threads on backnuts shall also comply with the test requirements of Annex A.

### 7.5 Floats, Float Arm and Assembly

**7.5.1** Floats should be either blow moulded hollow from polyethylene material or moulded solid from foamed polystyrene material or equivalent water repellent material and shall satisfy the tests specified in 6 of IS 9762 : 1981.

The float shall be watertight and non-absorbing and shall not contaminate water.

**7.5.2** The design of float arm shall incorporate a positive, readily accessible method of adjustment and locking to set the water level in the cistern

**7.5.3** Float arm and assembly shall be tested in accordance with Annex B and after the test the initial deflection shall not be more than 25 mm. Additional deflection after loading for 28 days as specified in Annex B shall not be more than 12 mm. Total deflection thus shall not be more than 37 mm

### 7.6 Discharge Arrangements

**7.6.1** The float valve shall be so constructed as to effectively prevent back-siphonage of water previously discharged at all water levels up to the horizontal centre line of the valve, also called the effective water level.

**7.6.2** If the discharge point is above the horizontal centre line of the valve it shall be at a level high enough to prevent back-siphonage. The construction shall not facilitate the fitting of any pipe or device to conduct water to a lower level

**7.6.3** If the discharge point is below the horizontal centre line of the valve, the discharge arrangements shall incorporate one or more constantly open air inlets or backflow prevention devices

## 8 PERFORMANCE TEST

### 8.1 Hydraulic Test

The valve shall be capable of withstanding whilst held in the closed position, an internally applied hydraulic pressure of  $2^{+0}_{-0.025}$  MPa for a period of  $60^{+5}_{-0}$  seconds, without leaking.

### 8.2 Shut-Off Test

When tested in accordance with Annex C, the valve when assembled in working condition but

without flow restrictions and fitted with the relevant seat and the float immersed to half its volume, shall remain closed against the following minimum test pressures as appropriate:

- HP seat — 1.05 MPa
- LP seat — 0.35 MPa

### 8.3 Antisiphonage Test

The valve when tested according to Annex D, shall have no back siphonage as indicated by the presence of water in the catchpot.

### 8.4 Flow Test

The valve shall be capable of delivering at least 9 litres of water in 140 seconds into the container when tested in accordance with the requirements of Annex E.

### 8.5 Endurance Test

The valve when tested in accordance with Annex F shall be capable of completing 200 000 cycles and shall then immediately satisfy the hydraulic and shut-off tests specified in 8.1 and 8.2.

### 8.6 Test for Hydraulic Pressure on Discharge Arrangements

The valve together with its discharge arrangements shall withstand a constantly applied hydraulic pressure without causing any permanent deformation or separation of any component part when tested in accordance with the method described in Annex G.

## 9 SAMPLING

### 9.1 Scale of Sampling

#### 9.1.1 Lot

In any consignment all the float valves of same type made of the same material and produced under similar conditions shall be grouped together to constitute a lot.

9.1.2 For ascertaining the conformity of the material to the requirements of the specification samples shall be tested from each lot separately.

9.1.3 Number of valves to be selected from a lot shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 2.

9.1.3.1 The valves from the lot shall be selected at random and in order to ensure the random-

**Table 2 Scale of Sampling and Criteria for Conformity**

Lot Size (1)	Sample Size (2)	Acceptance Number (3)
Up to 100	5	0
101 - 150	8	0
151 - 500	13	1
501 - 1 000	20	1
1 001 and above	32	2

ness of selection, procedures given in IS 4905 : 1968 may be followed.

### 9.2 Number of Tests and Criteria for Conformity

9.2.1 All the valves selected according to col 2 of Table 2 shall be examined for material, manufacture and workmanship and construction. Any valve failing in one or more of these requirements shall be considered as defective.

9.2.2 The lot shall be considered as conforming to these requirements if the number of defective items found in the sample is less than or equal to the corresponding acceptance number given in col 3 of Table 2.

9.2.3 The lot having satisfied the requirements given in 9.2.1 shall be further tested for hydraulic test (8.1), shut-off test (8.2), flow test (8.4) and test for hydraulic pressure on discharge arrangements (8.6).

9.2.3.1 For this purpose, the number of valves selected in col 2 of Table 2 shall be taken.

9.2.4 The lot shall be considered to have satisfied the requirements only if none of the sample fails in the requirements tested for 9.2.3.

### 9.3 Type Test

One sample each shall be subjected to antisiphonage test (8.3) and endurance test (8.4) at least once in a month. These tests shall pass. In case of failure(s), corrective action shall be taken in the manufacturing system and all the performance tests under 8 shall be repeated.

## 10 MARKING

10.1 Every valve shall be permanently and legibly marked with the following:

- a) Indication of the source of manufacture.
- b) Nominal size — 15 mm,
- c) Whether side or bottom entry,
- d) Class of valve — Diaphragm type, and
- e) Date of manufacture or lot number.

10.2 The valves may also be marked with the Standard Mark.

**ANNEX A**  
( Clauses 7.1 and 7.4 )

**TEST FOR SCREW THREADS FOR INLET AND BACKNUTS SHANKS**

**A-1** Apply a torque of 15 Nm in tightening the backnut of inlet shank by a spanner which is snug fit to the hexagon.

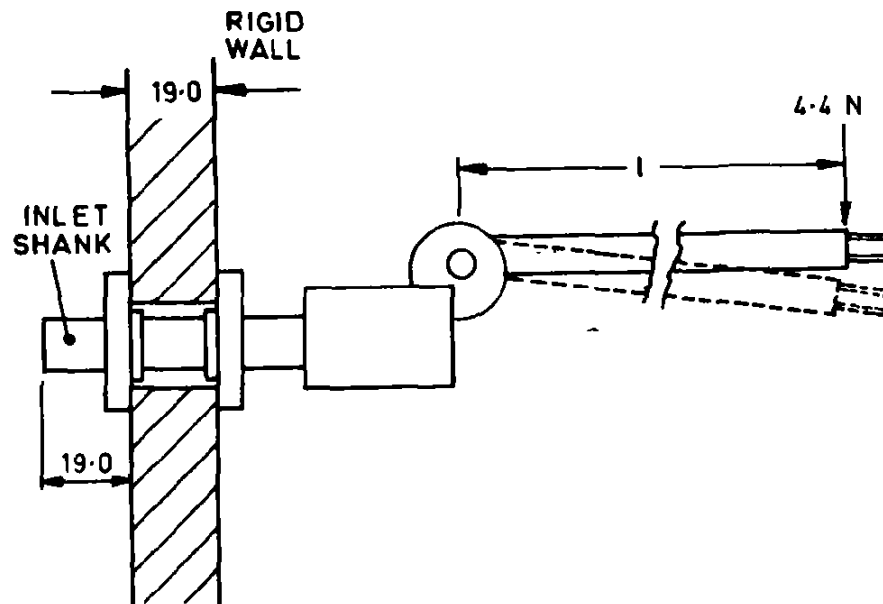
**A-2** There shall be no signs of visible distortion of the threads or of the flats of hexagon.

**ANNEX B**  
( Clause 7.5.3 )

**DEFLECTION TEST FOR ASSEMBLY**

**B-1** Modify the float valve to be tested by removing the diaphragm and substituting a rigid steel disc of the same diameter. Fix the assembled valve into a rigid wall 19 mm thick. Position the inlet shank within the wall so that the union nut end is 19 mm behind the wall. Gradually

apply a load of 4.4 N in the closing direction at the float connection and immediately note the deflection. Leave for 28 days in the loaded position and again note deflection at this point ( see Fig. 2 ).



All dimensions in millimetres  
FIG. 2 VALVE ASSEMBLY DEFLECTION TEST

**ANNEX C**  
( Clause 8.2 )

**SHUT-OFF TEST**

**C-1 APPARATUS**

A cistern in which the float valve can be installed and which allows the attached float to be half immersed in water. A water supply capable of providing the required pressure and a pressure gauge to indicate the test pressure.

**C-2 PROCEDURE**

Install the float valve assembly with the required seat in the cistern. Fill the cistern with water

until the float is immersed to half of its volume. Gradually apply an appropriate pressure up to that indicated in 8.2.

**C-3 RESULT**

Record any evidence of the valve passing water.

**NOTE** — For valves normally fitted with a discharge arrangement which conducts water in the cistern, it is permissible to remove the arrangement whilst conducting this test.

**ANNEX D**  
( Clause 8.3 )

**ANTISIPHONAGE TEST**

**D-1 APPARATUS**

The apparatus consists of:

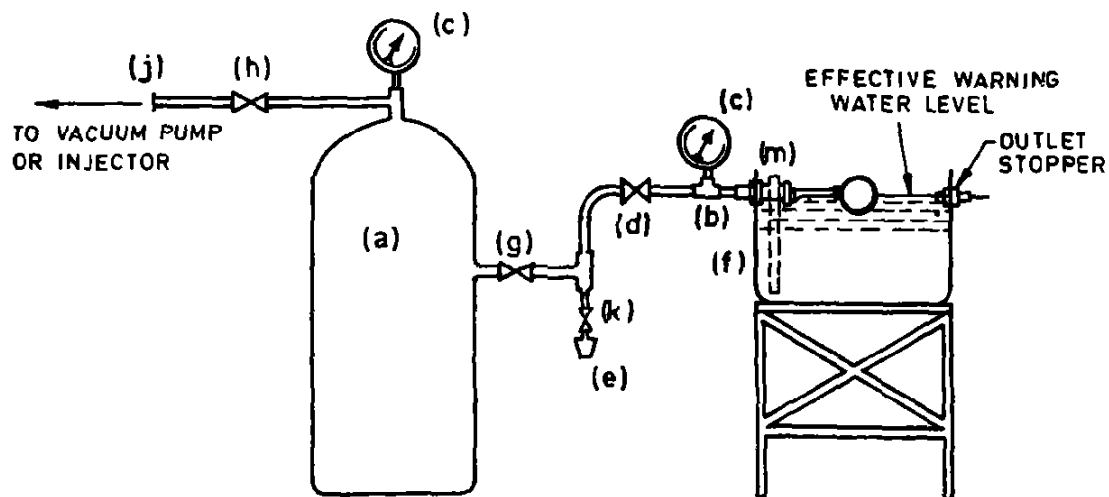
- a) A galvanized mild steel cylinder with modified connection on the side to take 50 mm dia pipework and with other connections for vacuum line, pressure gauge to indicate the test pressure ( see Fig. 3 )
- b) A transparent sight tube.
- c) Accurately calibrated vacuum gauges to measure 0 to 0.1 MPa vacuum.
- d) A 50 mm quick opening valve.
- e) A transparent catchpot.
- f) A galvanized mild steel cistern of not less than 225 litre capacity on a stand
- g) A full way valve of 50 mm diameter.
- h) A suitable shut-off valve.
- j) A mean of producing and maintaining vacuum of not less than 0.09 MPa ( for example a pump or ejector ).
- k) A drain valve.
- m) Valve under test.
- n) Pipework between cylinder and fitting to connect the above items as shown in Fig. 3 to be 50 mm in nominal bore and not exceeding 2 m in length.
- p) A water supply
- q) A length of 0.75 mm diameter nylon thread.

**D-2 PROCEDURE**

The following procedure shall be adopted:

- i) Fill the waterway over the whole passage from inlet to discharge by the insertion of the nylon thread.
- ii) Install the float valve and the float in the cistern.
- iii) Connect up the apparatus as shown in Fig. 3.
- iv) Run water into the cistern until the water level is at the horizontal centre line of the float operated valve.
- v) Close valves (d), (g) and (k) and open valve (h).
- vi) Activate the means for producing the vacuum until the gauge reading on the cylinder is 0.09 MPa.
- vii) Close valve (h) and open valve (g).
- viii) Quickly open valve (d) and allow it to remain open for 60 second.
- ix) Close valve (d) and (g) and open valve (k).
- x) Examine the catchpot for the pressure of any water.
- xi) Repeat the test so that the full vacuum is obtained over a period of not less than 60 seconds.

Adjust the water level in the cistern to 20 mm below the centreline of the valve and repeat the tests described in (v) to (x). Repeat the test at 20 mm intervals of level until the water level is at least 20 mm below the bottom end of the discharge arrangement.



- |  |                      |
|--|----------------------|
| (a) Mild steel cylinder                                      | (g) Full way valve   |
| (b) & (c) Vacuum gauge measure 0 – 0.1 MPa ( 0 – 762 mm Hg ) | (h) Shut-off valve   |
| (d) Supporting arrangement for cistern                       | (j) Drain valve      |
| (e) A catchpot   | (k) Valve under test |
| (f) Cistern  |                      |

FIG. 3 DIAGRAMATIC REPRESENTATION OF ANTISIPHONAGE TEST APPARATUS

**ANNEX E**  
( Clause 8.4 )

**FLOW TEST**

**E-1 APPARATUS**

A test rig ( see Fig. 4 ) capable of maintaining 1 m head of water at the inlet of the valve under test comprising of a cistern connected through the necessary 15 mm copper pipework to the specimen valve via a controlling gate valve.

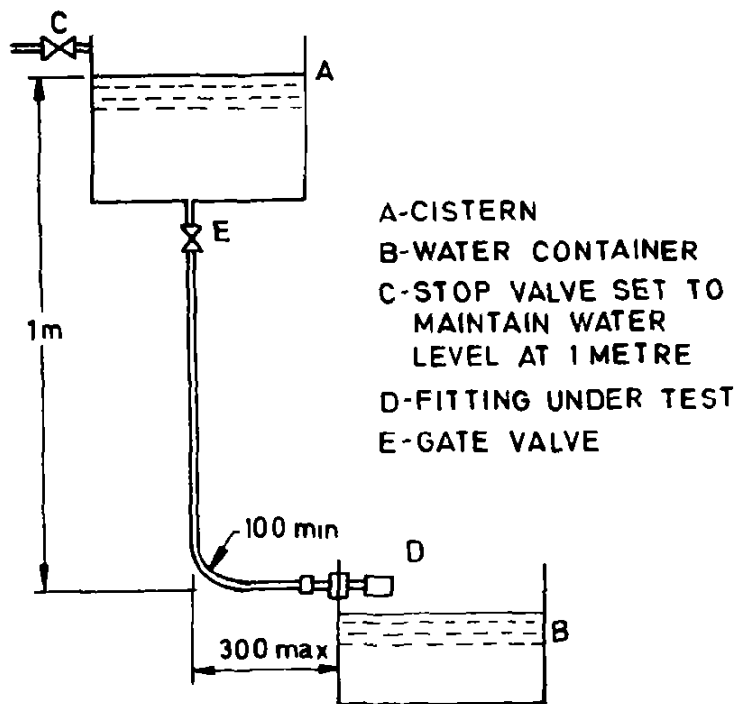
Cause the valve to discharge water from cistern A into container B for a period of 140 seconds while maintaining the water level in cistern A at a height of  $1^{+0.01}_-0$  m above the centre of the inlet of the valve for the duration of the test

**E-2 PROCEDURE**

Fit the valve ( installed with the LP seat ) to be tested together with its discharge arrangement

**E-3 RESULT**

At the end of 140 seconds, measure the volume of water in container B



All dimensions in millimetres.

FIG 4 DIAGRAM OF LOW PRESSURE SEAT MINIMUM FLOW TEST APPARATUS

**ANNEX F**  
( Clause 8.5 )

**ENDURANCE TEST**

**F-1 APPARATUS**

Test equipment capable of operating the float arm or arm assembly to open fully and to close fully the valve on an automatic cycle.

A water supply to be maintained at  $1.00 + 0.01$  m head. The water temperature not to exceed  $30^{\circ}\text{C}$ . A closure force equivalent to 10 N shall

be applied at the end of the float arm or arm assembly

**F-2 PROCEDURE**

Install the float valve onto the test rig:

- a) Fully open the valve in not less than one second.

- b) Allow the valve to remain in the open position for 2 seconds.
- c) Fully close the valve in not less than one second.
- d) Allow the valve to remain closed for a maximum of 2 seconds.
- The foregoing shall constitute one cycle of not less than 6 seconds duration.

## ANNEX G

( Clause 8.6 )

### METHOD OF TEST FOR EFFECT OF HYDRAULIC PRESSURE ON DISCHARGE ARRANGEMENT

#### G-1 APPARATUS

A cold water supply capable of providing a dynamic pressure of 1 MPa installed with pressure gauge immediately upstream of the valve under test.

#### G-2 PROCEDURE

Fit the valve to be tested with high pressure

seat and its discharge arrangement. Connect the valve under test to the apparatus and hold it in the fully open position. Gradually increase the supply pressure to 1 MPa. Maintain this pressure for ( 6 + 1 ) seconds

Record permanent deformation or separation of components, if any.



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### **Amendments Issued Since Publication**

Amend No.	Date of Issue	Text Affected

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