DRAFT SRI LANKA STANDARD SLS ×××× : 20××

DRAFT SRI LANKA STANDARD SPECIFICATION FOR FLOAT OPERATED VALVES PART 8: INLET FILLING VALVES FOR WC FLUSHING CISTERNS WITH INTERNAL OVER FLOW (INCLUDING FLOATER)

SRI LANKA STANDARDS INSTITUTION

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DRAFT SRI LANKA STANDARD SPECIFICATION FOR FLOAT OPERATED VALVES PART 8: INLET FILLING VALVES FOR WC FLUSHING CISTERNS WITH INTERNAL OVER FLOW (INCLUDING FLOATER)

FOREWORD

This standard was approved by the Sectoral committee on Materials, Mechanical Systems and manufacturing engineering and was authorized for adoption and publication as a Sri Lanka standard by the council of the Sri Lanka Standards Institution on ……………….

This document has been prepared in response to National Water Supply & Drainage Board as a part of their national programme on water conservation which implement under the directive and guidance of Ministry of Water Supply.
The formulation of this standard series have been introduced ten types of Float Operated Valves as follows,

1) SLS ×× : Part 1: 20××: Float operated valves of copper alloy body – piston and plunger type, (excluding floater)
2) SLS ×× : Part 2: 20××: Float operated valves of plastic body – piston and plunger type, (excluding floater)
3) SLS ×× : Part 3: 20××: Float operated valves of copper alloy body – diaphragm type, (excluding floater)
4) SLS ×× : Part 4: 20××: Float operated valves of plastic body – diaphragm type, (excluding floater)
5) SLS ×× : Part 5: 20××: Float operated valves for water closet flushing cisterns - compact type, (excluding floats)
6) SLS ×× : Part 6: 20××: Float operated valves for storage cistern - confined replenishing type (including floats)
7) SLS ×× : Part 7: 20××: Float operated valves for the storage cistern - rolling disc type (including floats)
8) SLS ×× : Part 8: 20××: Float operated valves for water closet flushing cisterns -Inlet Valve for Filling water Closet cisterns with internal over flow.
9) SLS ×× : Part 9: 20××: Float operated valves for cold water services -Copper floats
10) SLS ×× : Part 10: 20××: Float operated valves for cold water services -Plastic floats

Guideline for the determination of compliance of a lot with the requirements of this standard based on statistical sampling and inspection are given in **Annex A**.

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 an analysis shall be rounded off in accordance with SLS 102.

In the preparation of this standard, the assistance derived from the following publications are gratefully acknowledged.

1) BS EN 14125 - Inlet filling Valves for WC flushing cisterns (including floats)

2) BS 1212-4 :2016 - Compact type Float Operated Valves for WC flushing cisterns (including floats)

3) BS 2456 : 1990 - Specification for Float (plastics) for Float Operated valves for cold water services

1 SCOPE

This standard specifies the technical requirements for the Inlet Valve for Filling water Closet cisterns with internal over flow which is used to filling potable water into the flushing cistern of water closets (WC).

The purpose of this document is to specify the dimensional, hygiene, tightness, pressure performance, hydraulic, mechanical and physico-chemical characteristics which inlet valves for flushing cisterns shall comply with;

1. The test methods for testing these characteristics:

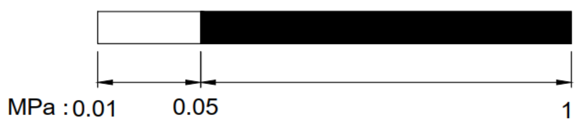
2. Marking and presentation.

This document applies exclusively to the valve itself and it does not prejudge compliance with health regulations as the inlet valve is being fitted into the cistern.

This document does not cover valves intended to equip flushing cisterns with external overflow.

This document applies to valves such as float valves limit operating at pressures up to PN 10 (whose operating range is from 0.05 MPa to 1 MPa – 0.5 bar to 10 bar) designed to supply cold water to flushing cisterns for use with WC pans, that are permanently connected to a potable water supply system.

The working range can be extended downwards (<0.05 MPa – 0.5 bar) down to 0.01 MPa (0.1 bar), in which case the manufacturer's instructions shall indicate this possibility as well as the recommended working range declared in **Table 1.**



Range which shall be covered
Optional range

This document does not apply to valves used for other applications: pumping tanks, storage tanks, etc.

Table 1 - Working conditions for flushing cistern inlet valves

	Operating limits	**Limit recommended for proper functioning (dynamic pressure)**
Minimum dynamic pressure	P≥0.05 MPa (0.5bar)[a]	0.1 MPa ≤ P≤0,5 Mpa (1 bar≤ P≤5 bar)
Maximum static pressure	P≤ 1 MPa (10 bar)	
a According to the manufacturer's indication, the dynamic pressure (opening-closing) can be lowered.		

2 REFERENCES

EN ISO 228-1	Pipe threads where pressure-tight joints are not made on the threads - Part 1: Dimensions, tolerances and designation
EN ISO 3822-1	Acoustics - Laboratory tests on noise emission from appliances and equipment used in water supply installations - Part 1: Method of measurement
EN ISO 3822-4	Acoustics- Laboratory tests on noise emission from appliances and equipment used in water supply installations - Part 4: Mounting and operating conditions for special appliances
EN ISO 5167-1	Measurement of fluid flow by means of pressure differential devices inserted in circular cross- section conduits running full - Part 1: General principles and requirements
EN 1717	Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow.

3 TERMS AND DEFINITIONS

For the purposes of this document, the following term and definition apply.

3.1 Inlet valve

Ensuring automatic filling of a flushing cistern to a pre-set water level

4 DESIGNATION

Inlet valves complying with this document are designated as follows:

1) Type of valve , Inlet valve
2) Connecting dimension.
3) Type of connection.
4) Operating range.

5 CLASSIFICATIONS

5.1 A flushing cistern inlet valve shall be designed as follows,

1. A single supply connection;
2. One or more outlets;

A detector, generally a float, for shutting off the water supply when the required level in the flushing cistern is reached.

Typical figure is given in **Figure 1.**

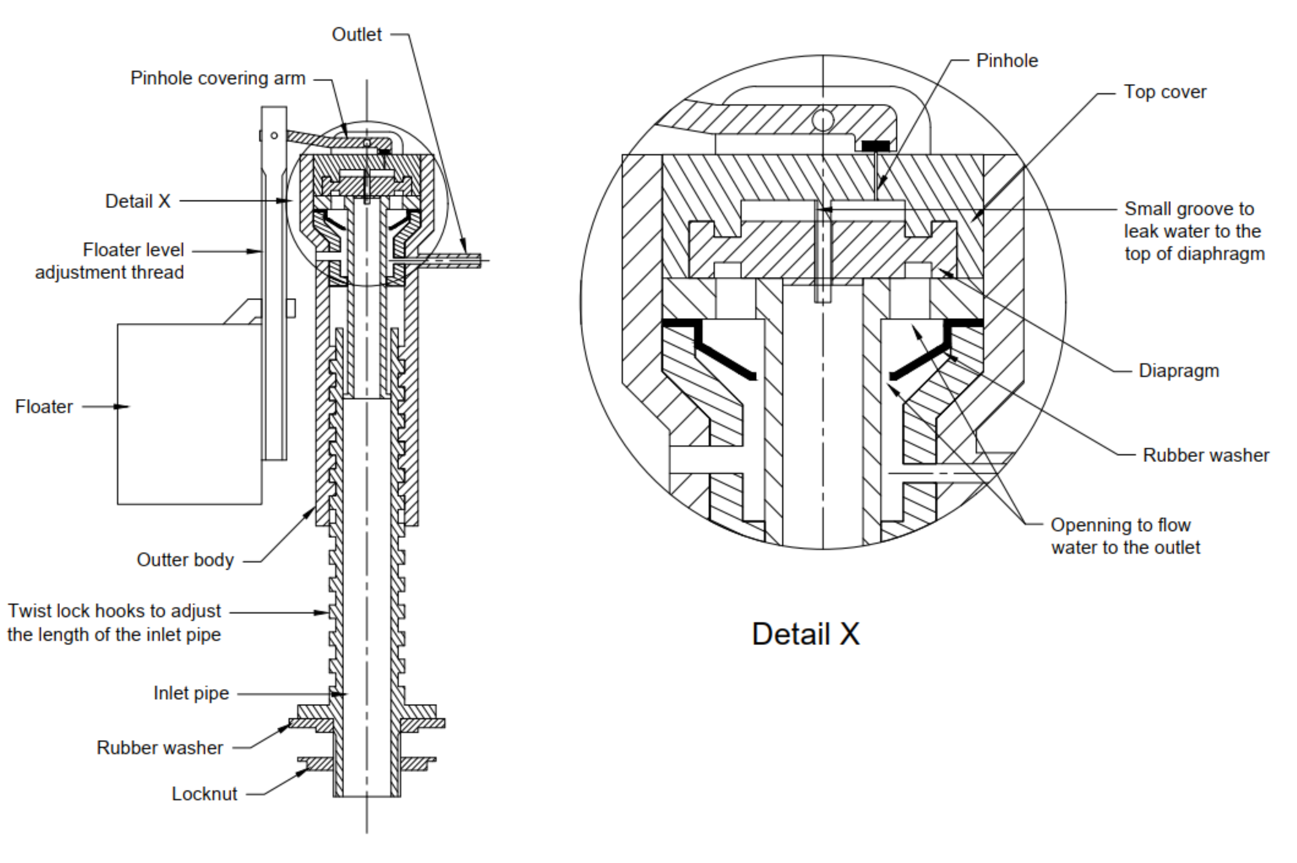


Figure 1 – Typical Fill valve with bottom inlet connection

5.2 Inlet valves can be connected inside the cistern to the supply network as follows:

1. Through the side;
2. Through the back;
3. Through the bottom;
4. Through the top.

It should not exist any submerged connection that can be dismantled or that may be dismantled inside the cistern.

5.3 Inlet valves for flushing cisterns can, if applicable, be fitted with a device used to adjust the water level in the cistern. If so, the water level in the flushing cistern can be adjusted within certain limits.

NOTE : *Bending the float arm to achieve adjustment is not considered to be an adjustment device.*

6 REQUIREMENTS

6.1 MATERIALS

The choice of materials is left to the manufacturer's initiative, except for end connections which shall be manufactured from copper alloy or any other material giving similar performance.

6.2 EFFECT ON NON-METALLIC MATERIALS ON WATER QUALITY

Material shall not adversely affect the quality of the drinking water and when tested in accordance with test method given in **Table 2** the extracted qualities of lead, tin, cadmium and mercury levels metals shall not exceed the levels specified in **Table 2.**

Table 2 : Limit of toxic substance

Toxic substance	Levels of toxic substance (third extraction), mg/l	Test method
lead	0.01	SLS 147 or BS 6920-section 2.6
Dialkyl tin as tin (C4 and above)	0.02	SLS 147 or BS 6920-section 2.6
Cadmium	0.003	SLS 147 or BS 6920-section 2.6
Mercury	0.001	SLS 147 or BS 6920-section 2.6

6.3 DIMENSIONAL REQUIREMENTS

6.3.1 Dimensions of the threaded end connections

In the event of use of a threaded end connection, the dimensions of the end connection shall comply with the specifications in **Table 3** below:

Table 3 - Dimensions of the end connections

Designation	Symbol	3/8	1/2	Observations
Outside diameter of the thread	d	G ⅜ B	G ½ B	Cylindrical gas pipe thread where pressure-tight joints are not made on the thread, tolerance class 8, complying with standard EN ISO 228-1
Diameter of the shoulder	D[a]	≥20mm [b]	≥32mm	for thin-walled cisterns (plastic or other material)
		≥28mm	≥32mm	for thick-walled cisterns (ceramic or other material)

Length of the thread	I	The length shall be such that tightening is possible on a cistern whose thickness is either 4 mm[b] or 12 mm. It shall be designed so that once the cistern is installed and the backnut and any pilot washer are in position, at least 8 mm for size 3/8 and 10 mm for size 1/2 is available for fitting the connecting nut.
[a] Size D can be obtained by means of a washer, a nut or a shoulder. [b] in some use, the end connection shouldering is not necessary.		

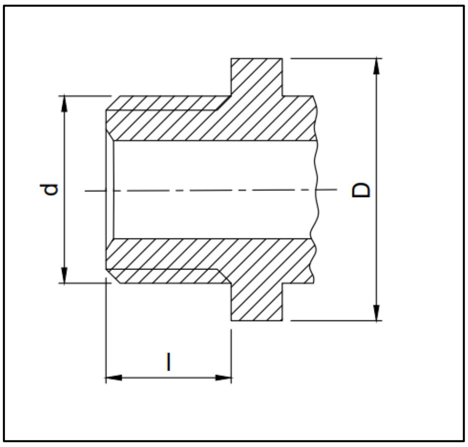


Figure 2 – Inlet tail

7 MECHANICAL AND HYDRAULIC CHARACTERISTICS

7.1 THREADED END CONNECTIONS

7.1.1 General

End connections manufactured from a plastic part material shall comply with the specifications below, Checks being made according to **Annex B**.

7.1.2 Tensile strength

End connections shall comply with the specifications below, checks being made according to **B.2** in **Annex B.**

After the test, there shall be no sign of deterioration on the end connections.

7.1.3 Resistance to tightening torque

End connections shall comply with the specification below, checks being made according to **B.3** in **Annex B**. After the test, there shall be no sign of deterioration on the end connections.

7.2 BACK FLOW PREVENTION

7.2.1 General

In order to prevent any risk of pollution of the potable water by back siphonage, the inlet valve air vent shall comply with EN1717.

An inlet valve whose outlet orifice is designed to operate only when immersed shall be fitted with an air inlet.

Note: An inlet valve whose outlet orifice is designed to operate without being immersed (e.g.: cisterns being supplied using air gaps) does not have to meet this characteristic since the air inlet is not necessary.

7.2.2 Dimension of the air inlet

In order to avoid fouling, an air inlet shall comply with the specification below.

The smallest dimension of the air inlet (for example, for an annular hole, the width of the ring and/or for a rectangular orifice, the smallest side) shall not be less than 4 mm.

7.2.3 Efficiency of the air inlet

Air inlets shall meet the specification below, checks being made according to **Annex C**.

Under the test conditions laid down in **Annex C**, no backflow shall be observed in the recovery vessel.

7.3 LEAK TIGHTNESS TEST

The leak tightness of an inlet valve shall meet the specifications below, checks being made according to **Annex D**.

7.3.1 Leak tightness under static pressure

Under the test conditions laid down in **D.2 in Annex D**, the difference size h in the water level shall not exceed 20 mm and the sealing efficiency of the valve when closed shall be ensured.

7.3.2 Leak tightness under dynamic pressure

Under the test conditions laid down in **D.3 in Annex D**, the difference size h in the water level shall not exceed 20 mm and the sealing efficiency of the valve when closed shall be ensured.

7.4 FLOW RATE AND FILLING TIME

The inlet valve flow rate and filling time shall meet the specifications in **Table 4**, checks being made according to **Annex E**.

Table 4 - Flow rate and filling time

Dynamic pressure *p*	**Flow rate** Q^a	**Filling time** ***s***

MPa	*l/s*		
		Flush volume	
		61	91
0.05	≥ 0,05	≤ 180	≤ 240
0.3	≤ 0,2		

[a] Valve being fully open.

7.5 REOPENING OF THE INLET VALVE

The reopening of the inlet valve shall comply with the specifications below, checks being made according to **Annex F**.

The reopening shall start after a 65 mm variation in the water level between the closing level and the flushing level. The closing of the inlet valve shall be ensured with an accuracy of ± 5 mm of the initial level.

The manufacturer shall specify how much the water level must be reduced till the reopening of the inlet valve.

7.6 WATER HAMMER TEST

The inlet valve shall meet the following specification on resistance to water hammer, checks being made according to **Annex G**.

Under the test conditions indicated in **Annex G**, the amplitude of the pressure wave (water hammer) shall not exceed 0.2 MPa (2 bar) of the supply static pressure (0.5 MPa (5 bar)).

7.7 RESISTANCE TO PRESSURE TEST

The inlet valve shall meet the specification on resistance to pressure mentioned below, checks being made according to7.8.
Under the test conditions specified in 7.8, there shall be no leakage or seeping and no visible deformation of the body or any parts of the valve.

7.8 ENDURANCE TEST

The endurance of the inlet valve shall comply with the performance below after checks being made according to **Annex J** for total 50,000 cycles.

After the endurance test, the inlet valve performance shall be ensured as per **7.8,** such as end of the test, leak tightness tests according to the specification in **7.3** as test for **7.8** and reopening of the filling valve according to the specification in 7.5 as pet per **Annex F**.

8 MARKING

A float operated valve shall be permanently and legibly marked in accordance with **8.1** & **8.2**.

8.1 Marking on the body

Inlet valves complying with this document shall be marked legibly and permanently as follows:

1) The manufacturers name or trade mark;
2) Operating range

If the valve is not fitted with an air gap, i.e., if the valve is fitted with an immersed outlet pipe, a mark enables us to locate the lower part of the air vent, or the maximum level for adjusting the overflow.

The manufacturer's documentation shall clearly specify whether the mark refers to the overflow level or to the lower part of the air vent.

8.2 Marking on the package

Each valve shall be included following information attached in package inside.

1) The manufacturers name or trade mark;
2) Batch no with designation
3) Details of designation specify in clause 4

9 SAMPLING

Sampling shall be carried out as given in **Annex A.**

ANNEX A

A.1 LOT INSPECTION

The sampling scheme given in this annex shall be applied where compliance for a lot to the requirements of this standard is to be assessed based on statistical sampling and inspection.

A.1.1 Lot

Any quantity of Float operated valve belonging to one batch of manufacturer shall constitute a lot.

A.2 SCALE OF SAMPLING

A.2.1 The number of Float operated valve to be selected from a lot for testing for dimensions, Materials, performance requirements and marking shall be in accordance with **Table 5**.

TABLE 5 – Scale of sampling

Number of bars in the lot (1)	Number of Float operated valves to be selected (2)	Sub samples to be selected (3)
Up to 500	5	2
500-1200	8	3
1201-3200	13	4
3201 and above	20	5

A.2.2 The Float operated valves to be tested shall be selected at random. To ensure randomness, the valves shall be drawn from a lot in accordance with **SLS 428**.

A.3 NUMBER OF TESTS

A 3.1 Each valves selected in accordance with column 3 of **Table 5** shall be inspected for and marking requirements specified in **8.**

A.3.2 Each valves selected in accordance with column 3 of **Table 5** shall be tested for Chemical properties specified in **6.1.**

A.3.3 Each valves selected in accordance with column 1 of **Table 5** shall be tested for Water quality specified in **6.2**.

A.3.4 Each valves selected in accordance with column 2 of **Table 5** shall be inspected for Dimensions in **6.3**.

A.3.5 Each valves selected in accordance with column 2 of **Table 5** shall be tested for requirements of threaded and end connection in **7.1**.

A.3.6 Each valves selected in accordance with column 2 of **Table 5** shall be inspected for Back flow prevention test specified in **7.2**.

A.3.7 Each valves selected in accordance with column 2 of **Table 5** shall be tested for Leak tightness test specified in **7.3**.

A.3.8 Each valves selected in accordance with column 2 of **Table 5** shall be tested for Flow rate and Filling time test specified in **7.4**.

A.3.9 Each valves selected in accordance with column 2 of **Table 5** shall be tested for the requirements of reopening the inlet valve specified in **7.5**.

A.3.10 Each valves selected in accordance with column 2 of **Table 5** shall be tested for Water Hammer test specified in **7.6.**

A.3.11 Each valves selected in accordance with column 2 of **Table 5** shall be tested for 7.7 Resistance to Pressure test specified in **7.6.**

A.3.12 Each valves selected in accordance with column 2 of **Table 5** shall be tested for 7.7 Endurance test specified in **7.6.**

A.4 CRITERIA FOR CONFORMITY

A lot shall be declared as conforming to the requirements of this standard, if the following conditions are satisfied.

A.4.1 Each valves inspected as in **A.3.1** satisfy the marking requirements.

A.4.2 Each valves inspected as in **A.3.2** satisfy the specified requirements for *chemical composition.

A.4.3 Each valves inspected as in **A.3.3** satisfy the effect on water quality.

A.4.4 Each valves inspected as in **A.3.4** satisfy the dimensional requirements.

A.4.5 Each valves inspected as in **A.3.5** satisfy the threaded and end connection requirements.

A.4.6 Each valves inspected as in **A.3.6** satisfy the Back flow prevention test.

A.4.7 Each valves inspected as in **A.3.7** satisfy the Leak tightness test.

A.4.8 Each valves inspected as in **A.3.8** satisfy the Flow rate and Filling time test.

A.4.9 Each valves inspected as in **A.3.9** satisfy the reopening the inlet valve requirements.

A.4.10 Each valves except inspected as in **A.3.10** satisfy the Water Hammer test.

A.4.10 Each valves except inspected as in A.3.10 satisfy the Resistance to Pressure test,

A.4.10 Each valves except inspected as in A.3.10 satisfy the Endurance test.

ANNEX B
TEST FOR END CONNECTIONS

B.1 Tensile test and torque test apparatus

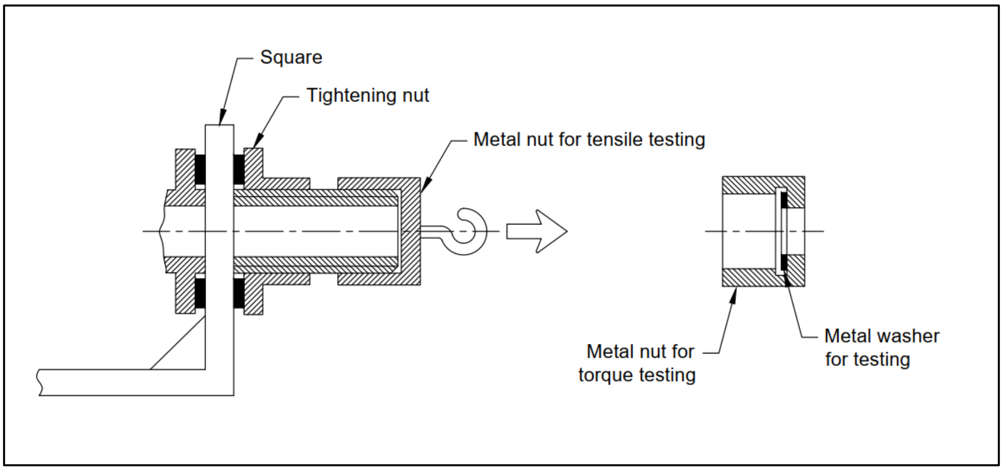


Figure 3 - Device intended to measure the tensile load and the tightening torque

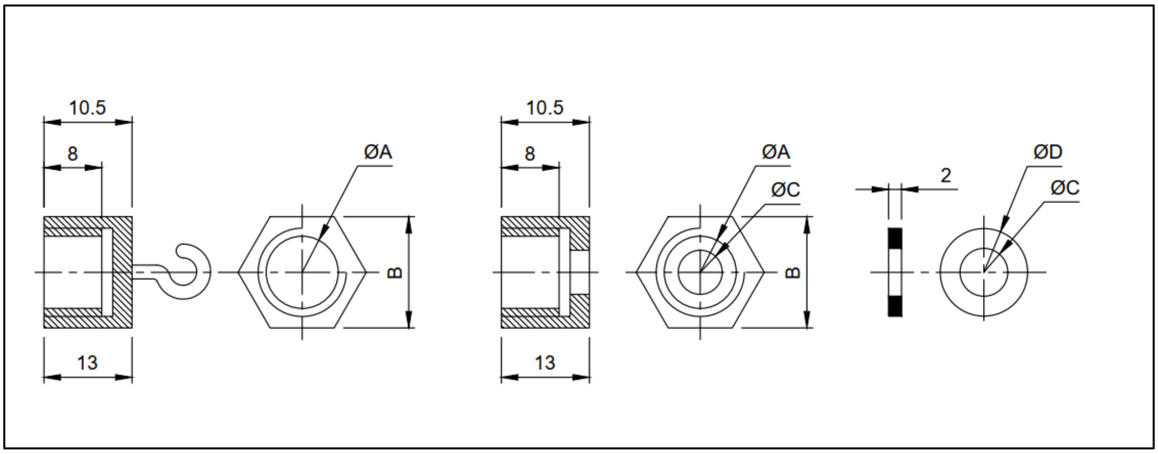


Figure 4 - Test nuts

Table 4 - Corresponding test nut dimensions

A	B dimension on flat	ØC	ØD
G3/8[11]B	19mm	10mm	14mm
G1/2[11]B	25mm	13mm	18mm

B.2 Tensile test operating method

Install the valve onto the square represented on **Figure 3** using the washer and nut supplied

by the manufacturer;
Follow the manufacturer's assembly instructions;

Apply a torque F to the back nut equal to 6 Nm for size 3/8 connections and to 10 Nm for size 1/2;

Clamp the tensile test nut to the very end of the connection so that it abuts on it without exerting any tightening;

Apply for one minute a force G to the tensile test nut equal to 75 N for size 3/8 connections and to 125 N for size 1/2connections.

B.3 Torque test operating method

Install the valve onto the square represented in **Figure 3** using the washer and nut supplied by the manufacturer;

Follow the manufacturer's assembly instructions;

Clamp the torque test nut by setting the torque test washer between the nut and the end connection;

Apply for one minute a force F equal to 6 Nm for size 3/8 connections and to 10 Nm for size 1/2 connections; clamp the body of the valve, if necessary, to make sure it does not rotate during the torque test.

ANNEX C
BACK FLOW PREVENTION TEST

C.1 Test apparatus

The vacuum apparatus shall have a sufficient power so that with: vacuum established at minus 0.8 bar;
3/8 test circuit (**Figure 5**) in place;

4 mm diaphragm positioned where the valve under test is positioned; recovery vessel;
Atmospheric pressure is not balanced until after 180 s minimum after the shut-off valve has opened completely

NOTE: *The vacuum apparatus (represented with a dotted line) is given for guidance.*

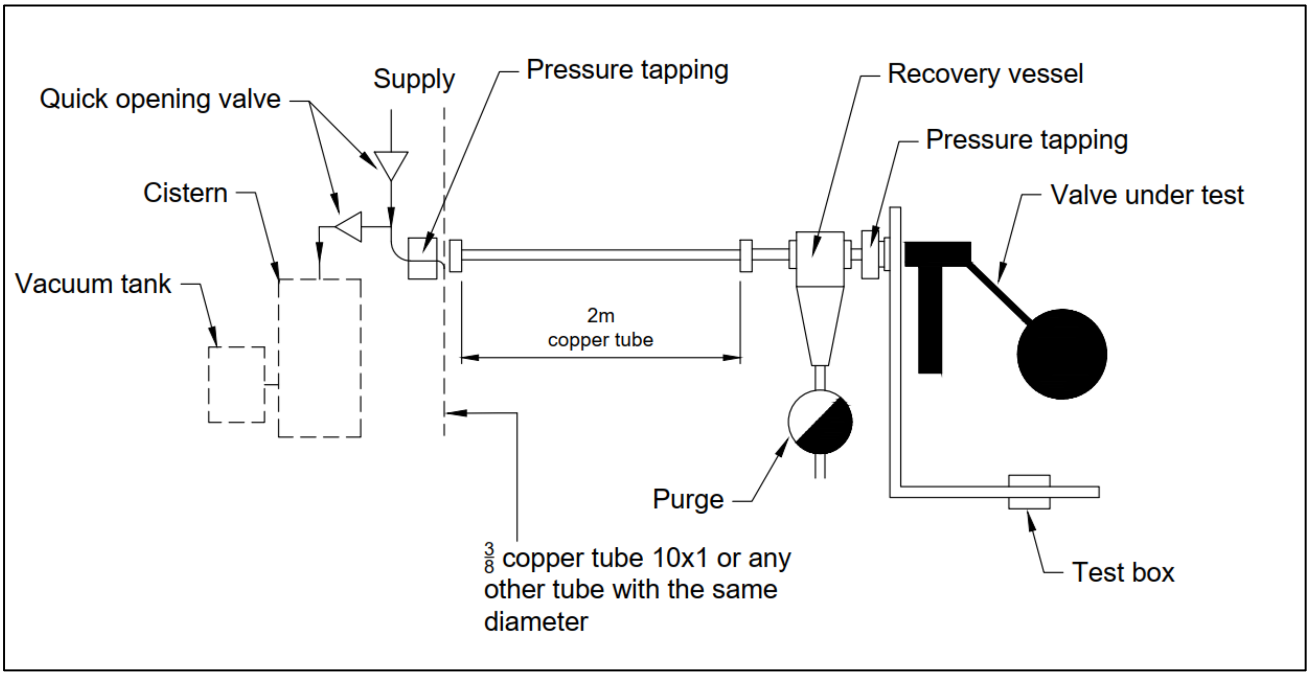


Figure 5 - Device intended to measure the backflow prevention system

C.2 Operating method

a) Install the valve into a typical cistern;

b) Purge and dry the supply circuit and the inlet valve before the test;

c) Hold the inlet valve open during the test and remove the valve's backflow prevention system, if any;

d) Connect the inlet valve to the test circuit;

e) Fill the typical cistern to the manufacturer reference level. It might be to the reference level of the overflow mark on inlet valve or 20 mm below the lower edge of the air inlet;

f) Open the valve and apply to the valve for not less than 5s a vacuum of 0.08 MPa (0.8 bar) from the vacuum tank;

g) Check the presence of water in the recovery vessel or in the transparent tube.

ANNEX D

LEAK TIGHTNESS TEST

D.1 Test apparatus

Apparatus of the type shown in **Figure 6** or similar to it can be used. It comprises:

a) A typical cistern whose dimensions comply with the dimensions of the cistern in Annex A. It shall be equipped with a drain valve, a purge valve and a cylinder with an internal diameter of 80 mm, communicating with the tank, with a pressure tapping fitted at the bottom;

b) A pressure transducer* connected on one side to the pressure tapping, on the other side to a yt recorder (for example, time-displacement).

Pressure transducer characteristics:

Measuring range from 0 to 0.05 MPa (0.5 bar). Accuracy > class I.
Response time ≤10 ms

Acquisition rate ≥40 Hertz acquisition/sec.

c) A supply circuit with a pressure adjusting device and a pressure gauge P, upstream of the valve under test. Two circuits are provided depending on whether the valve is side-supplied (case 1) or supplied from below (case 2).

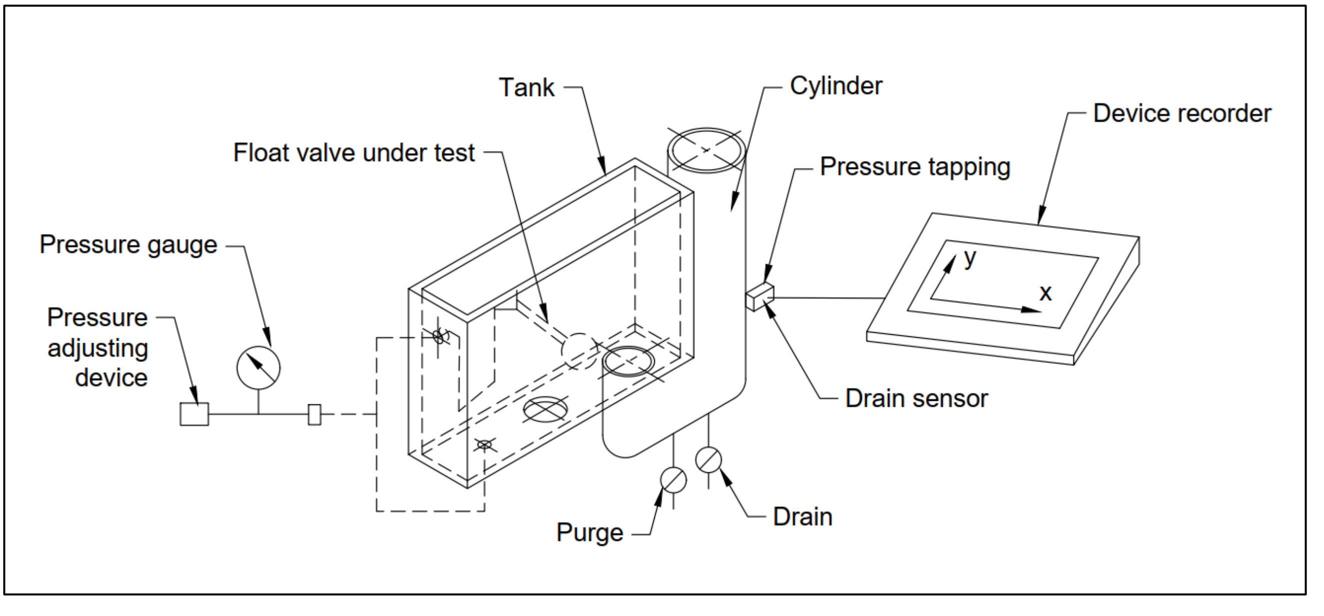


Figure 6 - Typical cistern

D.2 Static pressure test method

a) Use the typical cistern shown on **Figure 6** or a similar apparatus;

b) supply the valve with water at a dynamic pressure of (0,05 + 0,005/0) MPa ((0,5 + 0,05/0) bar), kept constant during the test until the inlet valve has closed completely (an additional test at the pressure indicated by the manufacturer if less than 0,05 MPa will be carried out for valves operating at a pressure below 0.05 MPa (0.5 bar) (opening and closing positions));

c) measure and record the level obtained on **Figure 7** (this recording will also be used for the dynamic pressure test);

d) wait 5 min;

e) increase the pressure to (0.3 + 0.02/0) MPa ((3+ 0.2/0) bar); measure and record the water level;

f) wait 5 min;

g) increase the pressure to (1 + 0.02/0) MPa ((10+ 0.2/0) bar); measure and record the water level;

h) Wait 5 min.

At the end of the test, check that value h complies with the specification in **7.3.1**.

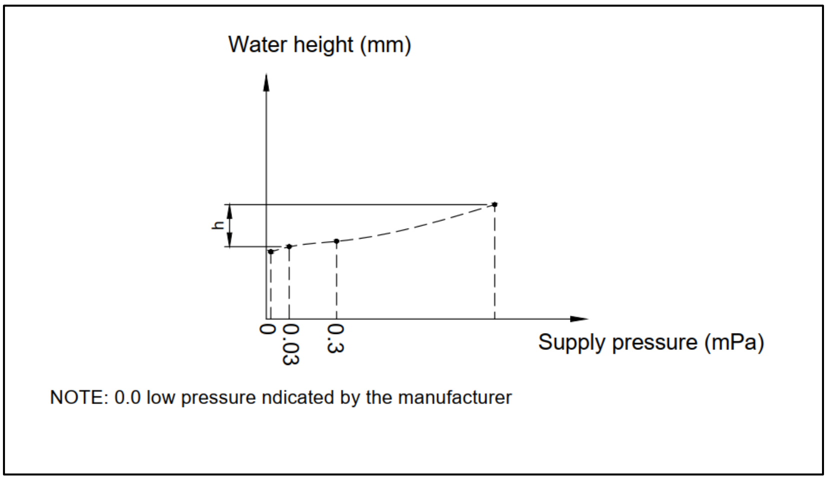


Figure 7 - Static pressure curve

D.3 Dynamic pressure test method

The test is performed at a dynamic pressure of (0.05 + 0.005/0) MPa ((0.5 + 0.05/0) bar), (0.3 + 0.02/0) MPa ((3 + 0.2/0) bar) and (0.6 + 0.02/0) MPa ((6 + 0.2/0) bar) respectively.

Use the typical cistern shown on **Figure 6** or a similar apparatus;

Supply the valve with water at a dynamic pressure of (0.05 + 0.005/0) MPa ((0.5+ 0.05/0) bar), kept constant during the test and record the filling up until the inlet valve has closed completely (**Figure 8**);

Purge the cistern;

Supply the valve with water at a dynamic pressure of (0.3 + 0.02/0) MPa ((3 + 0.2/0) bar); purge the cistern;

Supply the valve with water at a dynamic pressure of (0.6 + 0.02/0) MPa ((6 + 0.2/0) bar).

At the end of the test, make sure that value h (20 mm) meets the specification in **7.3.2**.

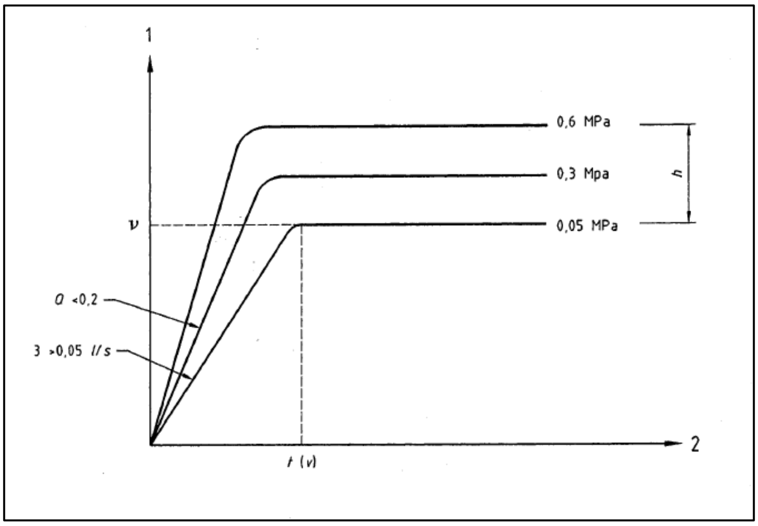


Figure 8 - Dynamic pressure curve

ANNEX E
INLET FLOW RATE TEST

E.1 Test apparatus

Apparatus of the type shown in **7.3.1** can be used. It shall comprise a flow meter but no pressure transducer (0 to 0.05 MPa).

E.2 Test method

a) Use the typical cistern shown on figure 6 with the drain valve in the open position, or a similar apparatus;

b) Supply the valve with water at a dynamic pressure of (0.05 + 0.005/0) MPa ((0.5+ 0.05/0) bar), kept constant during the test;

c) Record the flow rate value and the filling up time between the opening and closing of the valve;

d) Supply the valve with water at a dynamic pressure of (0.3 + 0.02/0) MPa ({3+ 0.2/0) bar), kept constant during the test;

e) Record the flow rate and the filling up time values.

At the end of the test, check that the flow rate values comply with the specifications in **7.4**.

ANNEX F

TEST METHOD OF REOPENING OF THE INLET VALVE

F.1 Test apparatus

Apparatus of the type shown in **7.3.1** can be used.

F.2 Test method

a) Install the valve into the typical test cistern;

b) supply the inlet valve with water at a dynamic pressure of (0,3 + 0,02/0) MPa ((3 + 0,2/0) bar);

c) record the water level, the valve being closed;

d) drain the level of water in the cistern of 65 mm and check that the inflow at the initial level is obtained with a precision of± 5 mm;

e) Record the water level corresponding to the reopening of the inlet valve.

At the end of the test, check that the reopening and closing of the valve shall meet the specifications in **7.5.**

ANNEX G

WATER HAMMER TEST

G.1 Test apparatus

Apparatus of the type shown on **Figure 9** or similar to it can be used.

a) Typical test cistern;

b) pressure transducer;

c) air tank;

d) supply circuit;

e) recorder

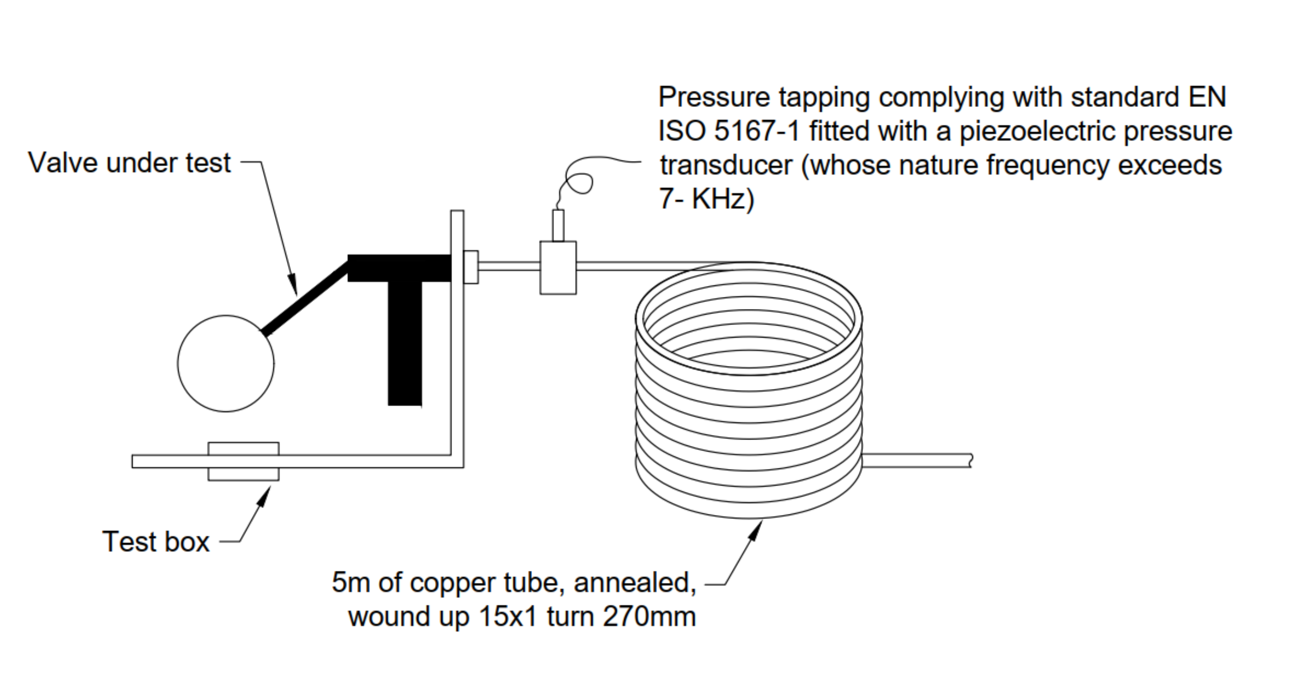


Figure 9 - Water hammer measuring device

G.2 Test method

a) Install the inlet valve into the typical test cistern;

b) supply the inlet valve with water at a static pressure of (0.5 + 0.02/0) MPa ((5 + 0.2/0) bar);

c) record the supply pressure value until the inlet valve closes;

d) Measure the difference between the maximal pressures in comparison with the static pressure.

At the end of the test, check that the pressure rise complies with the specification in **7.6.**

ANNEX H

TETS METHOD OF RESISTANCE TO PRESSURE

H.1 Test apparatus

a) Typical test cistern;

b) pressure transducer 1.6 MPa (16 bar);

c) Supply circuit.

H.2 Test method

a) Install the inlet valve into the typical cistern;

b) supply the inlet valve with water at a dynamic pressure of (0.3 + 0.02/0) MPa ((3 + 0.2/0) bar);

c) after the closing of the inlet valve, a mechanical device shall be arranged to maintain the valve closed;

d) increase the pressure progressively up to the static pressure value of (1.6 + 0.02/0) MPa ((16 + 0.2/0) bar);

e) keep submitting the inlet valve to a static pressure of 1.6 MPa (16 bar) for 5 min;

f) Check for any leakage, seeping or deformation.

ANNEX J
ENDURANCE TEST

J.1 Test apparatus

The test apparatus comprises a typical cistern onto which the valve to be tested is installed. The cistern is equipped with a water supply device and a water evacuation device.

It shall be designed so that it is possible to check:

a) the sealing efficiency of the valve throughout the test;

b) Operation of the valve, particularly during the critical end of closing period.

J.2 Test method

a) Install the valve into the test cistern and adjust the test apparatus so that the dynamic pressure of the inlet valve is kept constant at (0.15 ± 0.01) MPa (1.5 ± 0.1) bar and the water temperature supply of 15 at 25°c;

b) decrease the level of water in the cistern of (65 + 10/0) mm;

c) fill the cistern up to the closing of the inlet valve;

d) after closing, keep the valve in the closed position for (15 ± 5) s;

e) following the first 25 000 cycles (each cycle comprising the opening and closing of the valve), adjust the dynamic pressure of the inlet valve to 0.85 ± 0.05 MPa (8.5 ± 0.5 bar) with the maxi static pressure of 10 bar and repeat the test for 25 000cycles;

f) At the end of the test, carry out the leak tightness tests according to the specification in **7.3** and reopening of the filling valve according to the specification in **7.5**.