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

DRAFT SRI LANKA STANDARAD SPECIFICATION FOR FLOAT OPERATED VALVES PART 6: CONFINED REPLENISHING TYPE (INCUDING FLOATER)

SRI LANKA STANDARDS INSTITUTION

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DSLS ×××× : 20××

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DRAFT SRI LANKA STANDARAD SPECIFICATION FOR FLOAT OPERATED VALVES PART 6: CONFINED REPLENISHING TYPE (INCUDING 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.

The number of significant places retained in the rounded off value shall be the same as that of the specified value in this standard.

1. SCOPE

This standard specifies the technical requirements for the confined replenished type float operated valves use for filling potable water into a confined storage cistern (storage tank) which is used to store water for subsequent use, not being a flushing cistern.

The types of float operated valves covered in this standard are categories in concern with its inlet port closing by a vertical diaphragm valve with direct action or by using a vertical diaphragm valve with magnetic force or any other mechanisms.

The Standard specifies requirements of the valves for use in potable water supply systems where the pressure extends up to maximum of 1.4 MPa.

The range of nominal sizes covered in the standard are DN 10, DN 15, DN 20 and DN 25.

This standard covers the requirements regarding the dimensional parameters, materials & performance and testing requirements.

2. REFERENCES

ISO 6708	Pipework components – Definition and selection of DN (nominal size)
ISO 5208	Industrial valves — Pressure testing of metallic valves
ISO 815-1	Rubber, vulcanized or thermoplastic -Determination of compression set – Part 1: At ambient or elevated temperatures
ISO 48-4	Rubber, vulcanized or thermoplastic. Determination of hardness. Indentation hardness by durometer method (Shore hardness)
ISO 868	Plastics and ebonite. Determination of indentation hardness by means of a durometer (Shore hardness)
ISO 2768-1	General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications
ISO 2768-2	General tolerances – Part 2: Geometrical tolerances for features without individual tolerance indications
ISO 228-1	Pipe threads where pressure-tight joints are not made on the threads. Dimensions, tolerances and designation
ISO 1041-1	Plastic material designation
ISO 4185	Measurement of liquid flow in closed conduits — Weighing method

BS EN 1074-1	Valves for water supply. Fitness for purpose requirements and appropriate verification tests; Part 1- General requirements
BS EN 1074-2	Valves for water supply. Fitness for purpose requirements and appropriate verification tests; Part 2- Isolating valves
BS 6920-1	Suitability of non-metallic materials and products for use in contact with water intended for human consumption with regard to their effect on the quality of the water.
BS 1212-3	Float operated valves. Specification for Diaphragm type float operated valves -Plastic bodied (Excluding floater)
BS 2456	Specification for floats (Plastics) for float operated valves for cold water service
ASTM D 2240-15	Standard Test Method for Rubber Property - Durometer Hardness
ASTM D 395-03	Standard Test Methods for Rubber Property- Compression Set
SLS 297	Method of testing vulcanized rubber
SLS 614	Potable water
ASTM A240	Specifications for Stainless steel Material

3. TERMS AND DEFINITIONS

For the purposes of this standard the following definitions shall apply.

3.1 Float Operated valve: A pressure-opposed float operated valve that automatically controls the level of water in a storage Cistern.

3.2 Confined replenishing type float operated valve for storage cistern:

A float operated valve in which the flow of water is controlled by the flexing of a diaphragm which moment is directed by a float placing in a confined vessel. Once the water level of the storage cistern reaches its highest level, this water level remains at the same level, against removal of water from the tank by refilling the tank using a filling valve**.**

3.3 Inlet shank thread size: The inlet shank thread size is that corresponding with the thread designation of the ISO pipe thread on the inlet shank.

3.1. Nominal Size of "DN"

An alphanumeric designation of size for components of a pipework system, which is used for reference purposes. It comprises the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimeters, of the bore or outside diameter of the end connections. (ISO 6708:1995)

NOTE:

1. *DN size is related to inlet shank thread designation of ISO 228-1. (See table 6).*

2. *The nominal size of the valves are also designated as "NPS" or "A" . When the nominal sizes of valves are given in the designation of "NPS" or "A" the equivalent DN sizes are stated in the Annexure A.*

Nominal Size of "A"

It is an alphanumeric designation of size for reference purposes. The letter "A" proceeded by a dimensionless whole number. The number is indirectly related to the physical size in millimeters of the bore (ID) or outer diameter (OD) of the end connections. (Reference ISO 6708)

3.5 Nominal Size of NPS

The letters, NPS stand for Nominal Pipe Size. It is an alphanumeric designation of size for reference purposes. It comprises the letters NPS followed by a dimensionless whole number which is indirectly related to the physical size in inches of the bore (ID) of the end connections. (Reference ISO 5208)

3.6 Allowable operating pressure (PFA)

Maximum hydrostatic pressure which a pipe is capable of withstanding continuously in service (excluding surge).

NOTE :
PFA = PN rating for this type of valves only (see EN 1074-1)

3.4 Storage cistern (Storage tank)

A tank for storing water for subsequent use, not being a flushing cistern.

4. DESIGNATION

Confined replenishing type float operated valves for storage cisterns shall be designated by the following,

1) Type of Valve
2) The nominal size in DN
3) Pressure rating in MPa
4) The Nozzle/Diaphragm size
5) Diaphragm Movement method – direct /magnetic/specify if any other method
6) Type of plastic material as per ISO 1043-1

5. CLASSIFICATIONS

5.1 Confined replenishing type float operated valves float operated valves shall be designed for following two pressure classes.

1) Low pressure: Pressure range up to 0.7 MPa
2) High pressure: Pressure range from 0.7 MPa up to 1.4MPa

5.2 Confined replenishing type Float operated valves covered in this standard are classified taking in to account of closing the inlet port by a Diaphragm as follows,

1) Inlet valve closed by direct action of vertical diaphragm valve

2) Inlet valve closed by any other mechanism like magnetic force of vertical diaphragm valve

Inlet positioning of diaphragm in the valve is vertical and diaphragm shall be replaceable. Floater shall be place in a confined container/vessel which is a part of the valve.

The typical diagrams of confined replenishing type float operated valves are given in **Figure1 and Figure 2.**

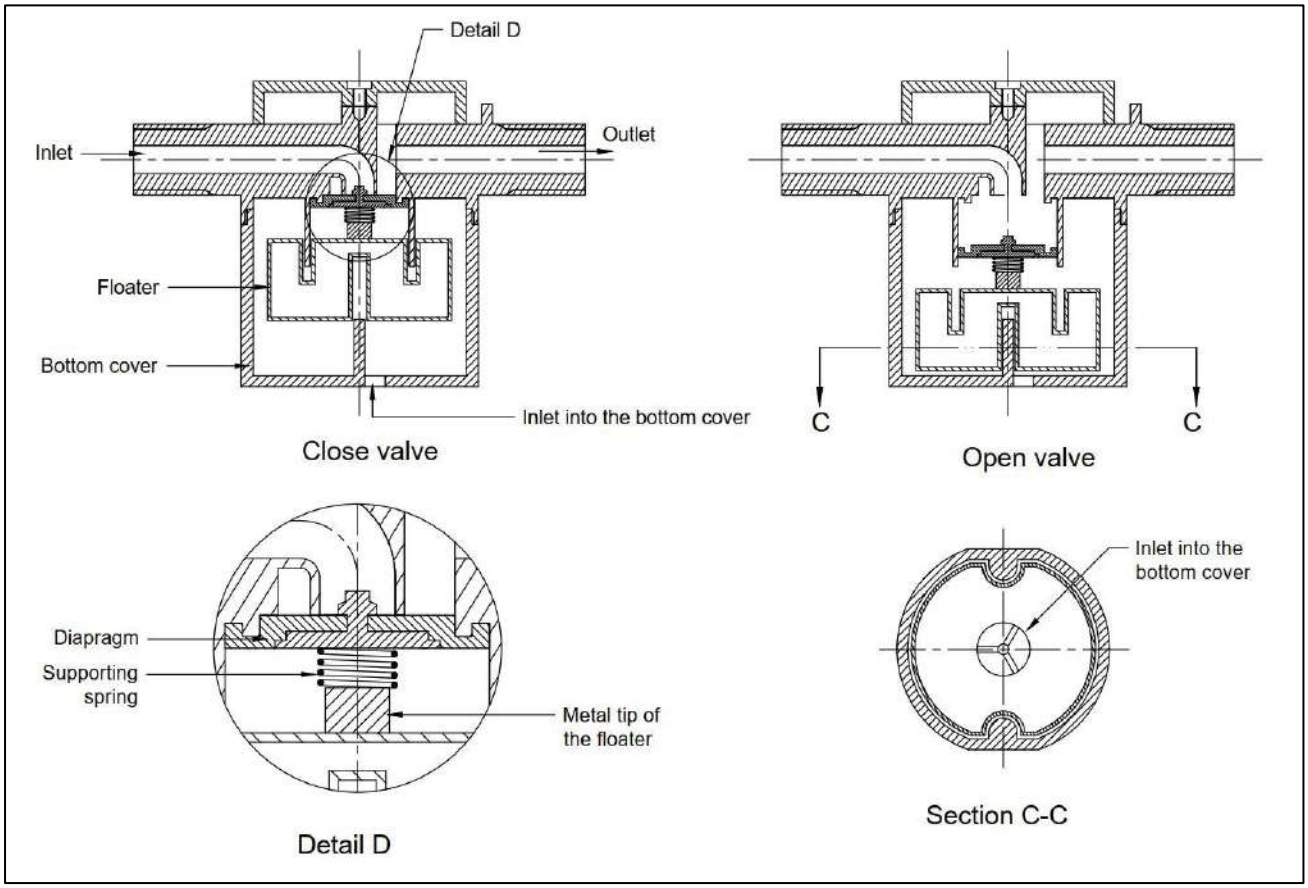


Figure 1 - confined replenishing type float operated valve – Direct Action

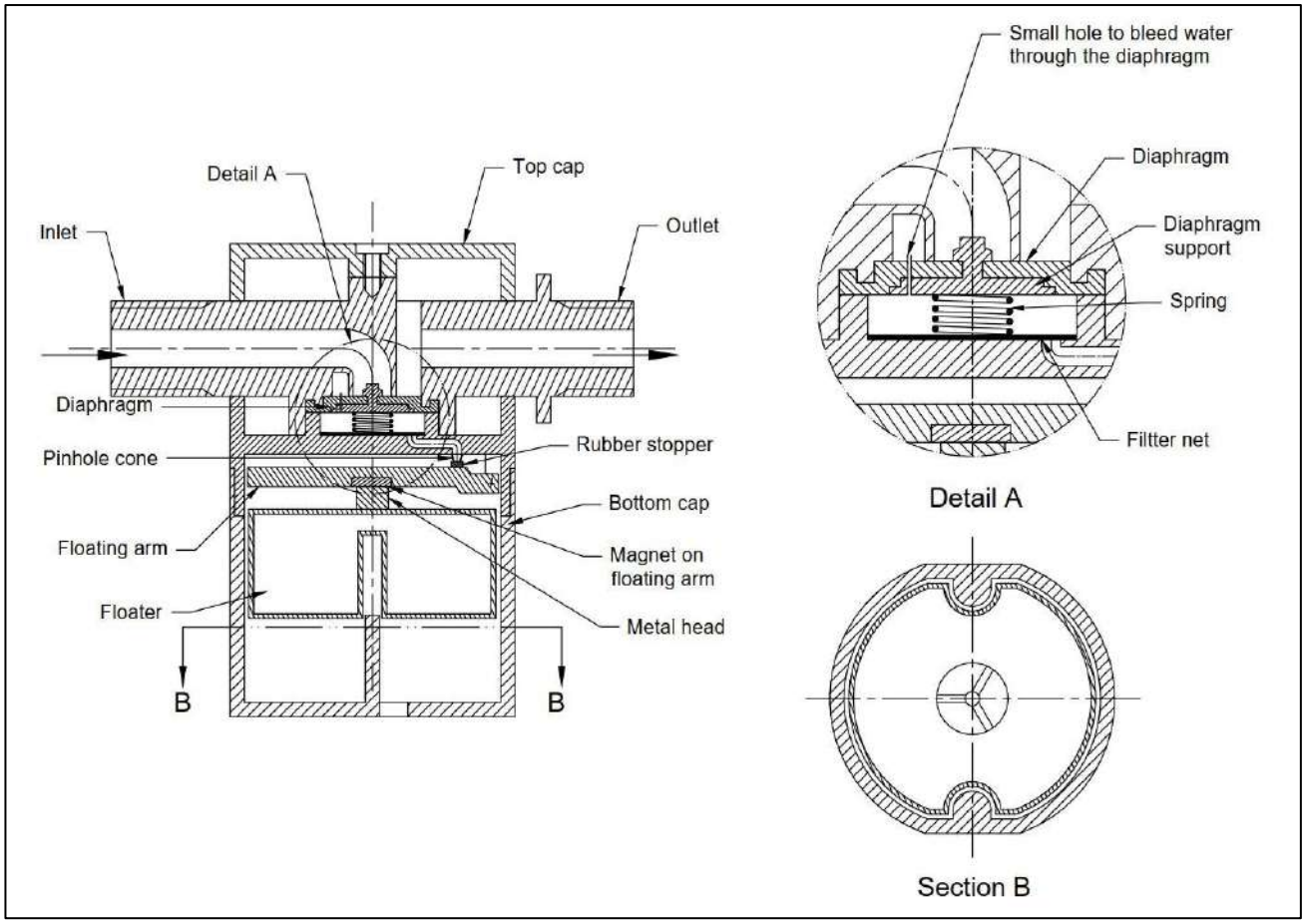


Figure 2a – Close

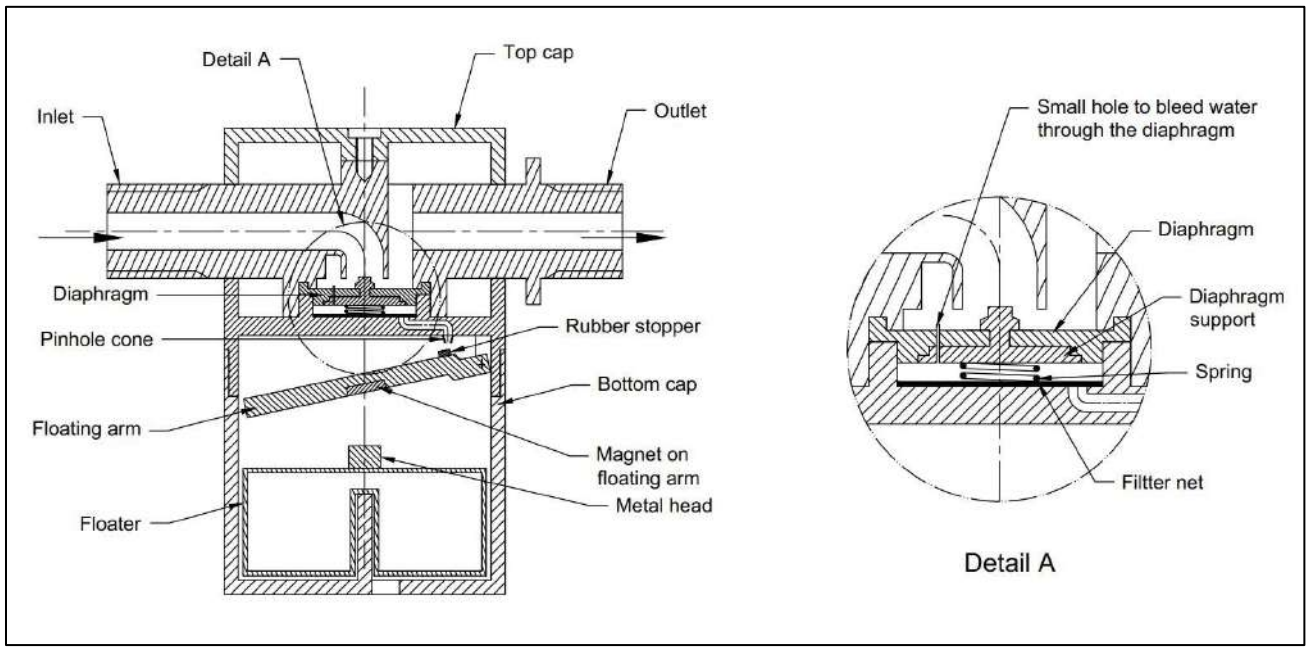


Figure 2b – Open

Figure 2– confined replenishing type float operated valve –magnetic force or **any other mechanism**

6 REQUIREMENTS

6.1 MATERIALS

61.1 Chemical composition of the components of the float operated valves

The type of materials used for the construction of the float operated valve shall conform to the **Table 1**.

Table 1 – Materials

Component	Plastic	Copper alloy	Stainless Steel	Rubber	Requirement
Body	√	√	√	×	**Clause 6.1.2, 4 & 5**
Floater	√	×	×	×	**Clause 6.1.2, 4 & 5**
Diaphragm	×	×	×	√	**Clause 6.1.3**
Spring	×	×	√	×	**Clause 6.1.4**
Other materials specified by the manufacturer	√	√	√	×	**Clause 6.1.2, 4 & 5**

6.1.2 Plastic material for major components

The manufacturer shall specify the thermoplastic materials used for manufacture of the above valve part by material composition name or its designation according to the ISO 1043-1. Declared material designation shall comply with ISO 1043-1.

No revoked material shall be used. Other plastic components if required manufacturer's own clean revoke material maximum up to maximum 15% is allowed.

Material hardness and other properties shall be declared by the manufacturer complying to meet performance indicators as per **clause 7.**

6.1.3 Rubber/ Elastomeric material – For Diaphragm

Rubber/ Elastomeric used for Diaphragms shall be complying with the requirements of **Table 2**.

Table 3 – Chemical composition of Copper or Copper alloy

Material designation / symbol	SCB3 (CuZn33Pb2)	DCB3 CuZn40Pb	PCB1 CuZn40Pb	G1	CZ122	CZ129	CW509L	CW 510L	CW511L	CuZn42Al-C	CuZn42Al-C
Standard	BS 1400	BS 1400	BS 1400	BS 1400	BS 2872	BS 2872					
CU	63 - 66	58 - 62	57 - 60		56.5 - 58.5	58.5 - 61.0	59 - 61.5	57 - 59	61.5 - 63.5	57 - 69	57 - 69
Sn	< 1.5	< 1.0	< 0.5	9.5 - 10.5	-	-	< 0.2	< 0.3	0.1	0.3	0.3
Zn	Remainder	Remainder	Remainder	1.75 - 2.75			Remainder	Remainder			
Pb	1.0 - 2.8	0.5 - 2.5	0.5 - 2.5	-1.5	1.5 - 2.5	0.8 - 1.5	< 0.05	< 0.2	0.2		
P	< 0.02	< 1.0		-						0.02	0.02
Ni	< 1.0	< 0.5		< 1.0	-	-	0.2	0.3		0.02	0.02
Fe	< 0.5	0.2 - 0.8	< 0.3	< 0.15	0.3	0.2	0.2	0.3	0.1	0.3	0.3
Al	< 0.1	< 0.5	< 0.5		-	-	0.05	0.05	0.05	0.1 - 0.3	0.1 - 0.3
Mn					-	-			0.1	0.02	0.02
As					-	-			0.02 - 0.15		
Si					-	-				0.02	0.02

Table 3 –continued…

Material designation / symbol	CW501L-DW (CuZn10)	CW506L-DW* (CuZn33)	CW507L-DW* (CuZn36)	CW508L-DW* (CuZn37)	(CuZn42Al)	(CuZn35Al1,5Sn)	CW724R (CuZn21Si3P)	CC768S (CuZn21Si3P-C)	CC771S (CuZn38AsSb-C)	C87700 (CuZn10Si4MnP)	CW617N (CuZn40Pb2)
Standard							EN 12164	EN 1982	EN 1982	EN 1412	EN 12164
CU	89 - 91	66 - 68	63.5 - 65.5	62 - 64	57 - 59	64 - 66	75 - 77	75 - 77	62 - 65	87.78	58
Sn	0.1	0.1	0.1		0.3		< 0.3	0.3	0.3	0.015	0.3
Zn							Remainder	Remainder	Remainder	8.793	Remainder
Pb	0.05	0.05	0.1	0.2	0.2		< 0.1	0.1	0.2	0.02	2
P							0.02 - 0.1	0.02 - 0.1	-	0.073	-
Ni	0.2	0.2	0.2				< 0.2	0.2	0.2	0.007	0.2-2.3
Fe	0.05	0.05	0.05		0.3		< 0.3	0.3	0.2	0.068	0.3
Al				0.05	0.1 - 0.3	1.4 - 1.6	< 0.05	0.05	0.45 - 0.7	0.001	0.05
Mn							< 0.05	0.05	-	0.067	-
As							-	-	0.02 - 0.04	< 0.001	-
Si							2.7 - 3.5	2.7 - 3.5	-	3.15	-
Sb							-	-	0.002 - 0.05	0.001	-
S							-	-	-	-	other 0.0002

Table 3 –continued…

Material designation / symbol	CW612N (CuZn39Pb2)	CC772S (CuZn36Pb.5AsSbAl)	CW725R (CuZn33Pb.AlSiAs)	CC499K (CuSn5Pb2)	CW614N (CuZn39Pb3)	CW603N (CuZn36Pb3)	CC757S (CuZn39Pb2Al-C)	CC770S (CuZn39Pb-C)	CW626N (CuZn33Pb1.5AlAs)	CW625N (CuZn35Pb1.5AlAs)	(CuZn35Al-C)
Standard	EN 12164	EN 1982	EN 12164	EN 1982	EN 12164	EN 12164	EN 1982	EN 1982	EN 12164	EN 12164	EN 1982
Cu	59 - 60	62 - 65	64 - 67	84 - 88	57 - 62	61	58.63	62 - 64	64 - 66	62 - 64	63 - 64
Sn	0.3	< 0.3	< 0.3	4-6	< 0.3	0.2	0.5	0.3	-	0.3	< 0.3
Zn	Remainder	Remainder	Remainder	4-6	Remainder	Remainder	Remainder	Remainder	Remainder	Remainder	Remainder
Pb	1.8 - 2.5	0.2 - 1.1	0.4 - 0.6	0.2 - 0.3	2.5 - 3.5	3	0.2 - 1.4	0.2 - 1.6	1.2 - 1.5	1.2 - 1.6	< 0.2
P	-	-	-	<0.4	-	-	-	-	-	-	-
Ni	0.3	< 0.2	< 0.2	0.1 - 0.6	< 0.2	0.3	0.2	0.2	< 0.2	0.3	-
Fe	0.3	< 0.2	< 0.3	< 0.3	< 0.3	0.3	0.3	0.3	< 0.1	0.3	< 0.3
Al	0.5	0.45 - 0.7	0.1 - 0.4	-	< 0.05	0.05	0.3 - 0.9	-	0.8 - 0.9	0.5 - 0.7	0.2 - 0.7
Mn	-	< 0.1	< 0.1	-	-	-	0.05	0.1	< 0.1	0.1	< 0.1
As	-	0.02 - 0.4	0.4 - 0.8	-	-	-	-	0.04 - 0.14	0.02 - 0.08	0.02 - 0.15	0.04 - 0.14
Si	-	-	0.1 - 0.3	-	< 0.03	-	0.05	-	-	-	-
Sb	-	0.03 - 0.06	-	< 0.1	-	-	-	-	-	-	-
S	-	-	-	< 0.04	-	-	-	-	-	-	-

NOTE : *If Zn content is ≥15% then Dezincification test shall be submitted along with consignment..*

Table 2– Requirements for physical properties of vulcanized rubber

–

Test (1)	Requirement (2)	Test method (3)
Hardness, degree IRHD	60 $^{+5}_{-4}$	SLS ---ISO 48 Part 2
Tensile strength, MPa, min. Elongation at break, %, min.	17 400	**SLS 297 : Part 2,** Dumb-bells, 2.0 mm thick
Compression set at 70^0C, %, max.	30	**ISO 815,** method A Type 1 test piece, lubricated
Resistance to heat ageing, 168 h at 70^0C Change in tensile strength, % of original value, max. Change in elongation at break, % of original value, max.	 −10 −15	 **SLS 297 : Part 5**, method A or Method B. **SLS 297 : Part 2,** Dumb-bells, 2.0 mm thick

6.1.4 Copper Alloy materials

Copper or copper alloy use for any part of the valve shall comply the chemical composition specified in **Table 3,** as applicable, when tested according to Spectrometric methods specified in one of the international standards listed in ISO /TR 9769

6.1.5 Stainless Steel

Stainless Steel use for any part of the valve shall comply the chemical composition specified in **Table 4.**

Table 4 - Chemical Composition – Stainless Steel

Material /EN Code	EN 1.4401	EN 1.4404	1.4408	1.4571	1.4581
Ferrous	Balance	Balance	Balance	Balance	Balance
Carbon - Max	0.08	0.03	0.07	0.08	0.07
Chromium	16 -18.5	16 - 18.5	18 - 20	16.5 -18.5	18 - 20
Nickel	10 - 14	10 - 14	9 - 12	10.5– 13.5	9 - 12
Molybdenum	2 - 3	2 - 3	2 - 3	2 - 3	2 –2.5
Manganese - Max	2	2	2	2	1.5
Nitrogen -Max	0.11	0.11	-	-	-
Prosperous - Max	0.045	0.045	0.045	0.045	0.045
Silicon - Max	1.0	1.0	1.5	1.0	1.5
Sulfur - Max	0.03	0.03	0.03	0.015	0.03
Copper – CU - Max	-	-	0.5	-	0.5
Ti- Max	-	-	-	0.7	-
Nb - Max	-	-	-		1

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 5** the extracted qualities of lead, tin, cadmium and mercury levels metals shall not exceed the levels specified in **Table 5.**

Table 5 : 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

6.3.1General

The dimensions of the assembly and components of confined replenishing float operated valves for storage cisterns cover under this standard shall be declared by the manufacturer in the design or drawings it shall comply with a working tolerances given in **Table 6** if no tolerance has been stated.

Certain dimensions & tolerances (see **Table 6**) of Confined replenishing type float operated valves for DN 10 & 25 shall conform to requirement specified in **6.3.2** to **6.3..5** of this standard .

Table 6 – Dimensional tolerance for the manufacturers design

Nominal size of Float operated valve ,DN	Tolerance for the manufacturers design in mm specified in the drawing/ design
10	±0.3
15	±0.3
20	±0.3
25	±0.5

NOTE:

Any other types float operated valves covered under this standard, tolerances of dimensional requirement according to the design / drawing are also acceptable.

6.3.2 Inlet Shank (Inlet connection)

The inlet shank shall be screwed ISO pipe thread to ISO 228 ‘Class A’ the same thread designation as the float valve, is the same nominal size as the valve.

The inlet shanks side entry and bottom entry shall have dimensions as given in **Figure 3** and **Table 7**.

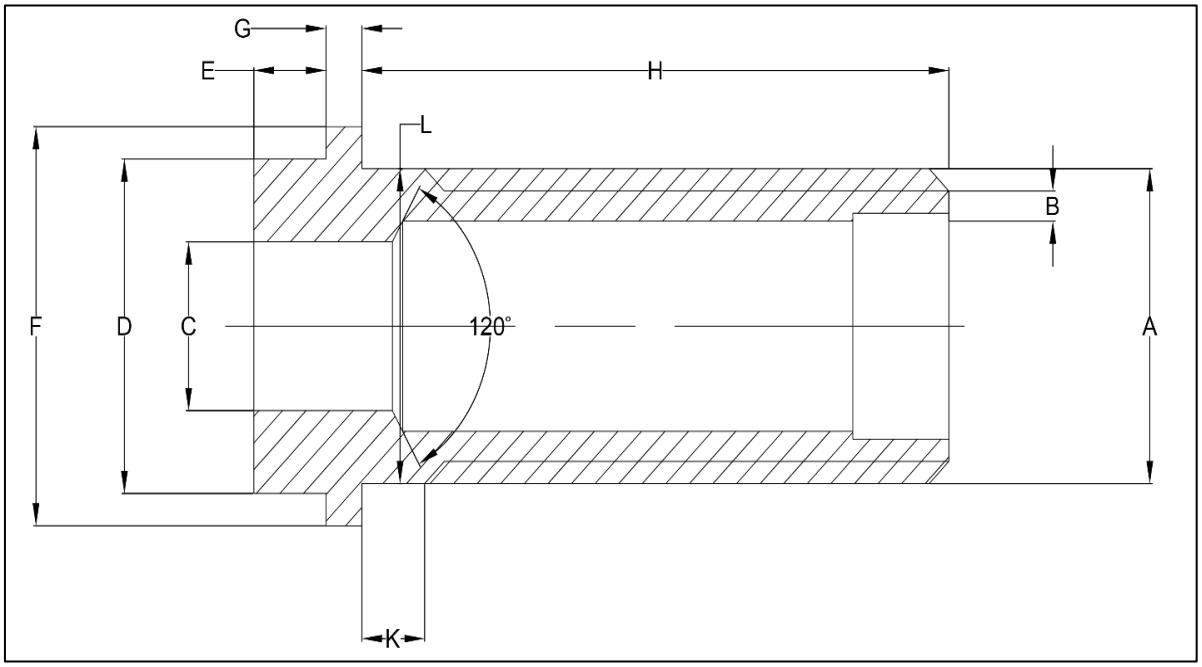


Figure 3 - Inlet shank

Table 7 - The dimensions of the inlet connections

Feature		Thread Size							
		10 DN		15 DN		20 DN		25 DN	
(1)	(2)	max (3)	min (4)	max (5)	min (6)	max	min	max	min
A	Major dia. of ISO pipe Thread	16.662	16.412	20.955	20.671	26.441	26.157	33.249	32.889
B	Thickness of wall, minor dia. to bore	2.9	2	2.9	2	na*	2.0	na*	2.7
C	Bore through spigot	11.2	10.3	11.2	10.3	15.9	15.0	19.1	18.2
D	Outside dia. Of spigot	22.2	22	22.2	22	24.2	23.8	28.6	28.2
E	Axial length of spigot	5.4	5	5.4	5	8.6	8.2	13.3	12.9
F	Diameter of collar	26.5	26.3	26.5	26.3	32.1	31.8	40.2	39.9
G	Length of collar	2.7	2.3	2.7	2.3	2.7	2.3	3.5	3.1
H	Length of tail under collar	na*	44.5	na*	44.5	na*	46.0	na*	53.0
K	Length of plain tail	na*	4.75	na*	4.75	na*	4.7	na*	6.3
L	Outside dia. At K	21	na*	21	na*	26.4	na*	33.2	na*

NOTE : *NA* - Not Applicable*

6.3.3Backnuts

The inlet shank of every float valve shall be provided with two backnuts, outer & inner.

The outer one being as specified below.

a) The outer back nut shall conform to the dimensions given in **Figure 4 A & Table 8**.

The Inner one being of the type specified below.

b) The Inner back nut shall conform to the dimensions given in **Figure 4 B & Table 8.**

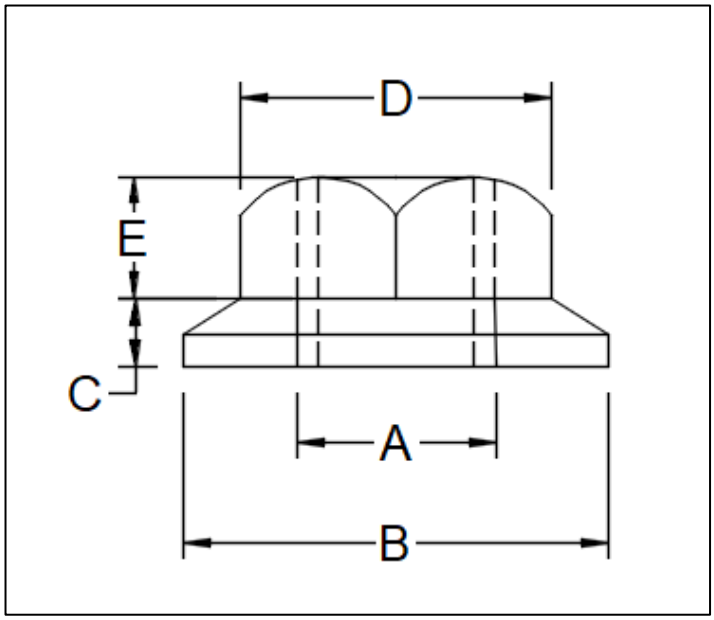


Figure 4A - Outer back nut

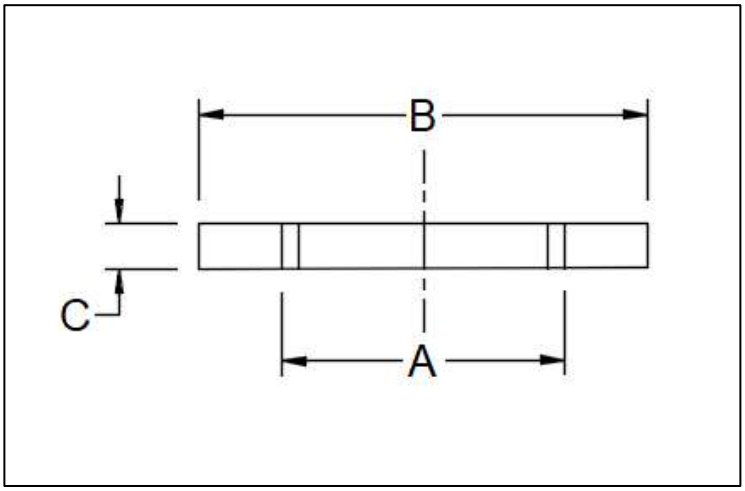


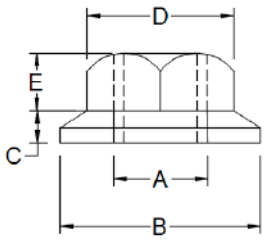
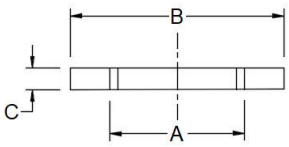
Figure 4B – Inner back nut

Figure 4 – Shape of back nuts.

Table 8 – Shape and dimensions of back nuts.

(All dimensions in millimeters)

Features	**Type (a)**			**Type (b)**		

(1)	(2)				(3)			
Shape								
A	DN 10 Pipe thread ISO 228/1- G $\frac{3}{8}$ A	DN 15 Pipe thread ISO 228/1- G $\frac{1}{2}$ A	DN 20 Pipe thread ISO 228/1- G ¾ A	DN 25 Pipe thread ISO 228/1- G 1 A	DN 10 Pipe thread ISO 228/1- G $\frac{3}{8}$ A	DN 15 Pipe thread ISO 228/1- G $\frac{1}{2}$ A	DN 20 Pipe thread ISO 228/1- G ¾ A	DN 25 Pipe thread ISO 228/1- G 1 A
	min.	min.	min.	min.	min.	min.	min.	min.
B	28.5	38.0	38	45	32.0	35.0	37	47
C	2.5	2.5	3	3.8	5.0	5.0	6.3	9.5
D	20.0	25.0	31	38	-	-	-	-
E	7	7	7	7.8	-	-	-	-

6.3.4 Other parts in connection with inlet closing mechanism if any

If any part design by manufacturer to fulfil the confined replenishing type float operated valve, design or drawing shall be supplied to the relevant authority with material description.

6.3.5 Discharge arrangement

Manufacturer shall have freedom to design the discharge arrangement which prevents back sinphonage of water previously discharge by float valve.

6.4 WORKMANSHIP AND FINISH

6.4.1 Castings

All castings shall be sound, free from laps, blowholes and pitting. Both the outside and inside surfaces shall be clean, smooth, free from sand and neatly dressed. No casting shall be burned, plugged, stopped or patched.

6.4.2 Hot Pressings

All hot pressings shall be sound, without laminations and shall be smooth and well finished.

6.4.3 Moulding/machining

All matching shall be carried out so that parts are true to shape within the limits of size specified in this standard and are correct in alignment when assembled. All machined surfaces shall be smoothly finished.

6.4.4 Screw Threads

Except where otherwise stated in this standard, screw threads shall comply with ISO 228-1.

7. PERFORMANCE REQUIREMENTS

7.1 Hydraulic pressure test

The valve body shall be withstand a hydraulic pressure of 1.5 x PFA at working conditions without any leakage or sweating when tested in accordance with **Annex C.**

NOTE :

PFA = manufacturer designated pressure

7.2 Shut off test

The valve shall not be shown any leakage or sweating when tested in accordance with **Annex D.**

7.3 Dynamic Pressure Test

Every float valve, when assembled at working condition, with the float with which it will be used and operated in specified pressure at fully open position shall show no any permanent deformation or separation of any component or part.

Test Procedure is described in **Annex E.**

7.4 Flow test

Every float shall be capable of delivering minimum water quantity which declared by the manufacturer when tested as per the Annex **F**.

7.5 Endurance test

All operating parts shall be withstanding to minimum of 200,000 of working cycles tested in accordance with **Annex G**, without deteriorating its performance. Hence, after completion of the test cycle, the Hydraulic pressure test and shut off test shall be repeated and comply with **7.1 & 7.2**.

8. MARKING
9.

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

8.1 Marking on the body

1) The manufacturers name or trade mark;
2) Diameter

9.2 Marking on the package

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

1) The manufacturers name or trade mark;
2) Diameter in DN
3) Pressure Class
4) Other details / special precautionary method for water pollution /back flow prevention specified by manufacture if any
5) Batch no with designation

9.0 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 9**.

TABLE 9 – 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 9** shall be inspected for and marking requirements specified in **8.**

A.3.2 Each valves selected in accordance with column 3 of **Table 9** shall be tested for Chemical properties specified in **6.1.**

A.3.3 Each valves selected in accordance with column 1 of **Table 9** shall be tested for Water quality specified in **6.2**.

A.3.4 Each valves selected in accordance with column 2 of **Table 9** shall be inspected for Dimensions in **6.3**.

A.3.5 Each valves selected in accordance with column 2 of **Table 9** shall be tested for workmanship & finish in **6.4**.

A.3.6 Each valves selected in accordance with column 2 of **Table 9** shall be inspected for Hydraulic pressure test specified in 7.1.

A.3.7 Each valves selected in accordance with column 2 of **Table 9** shall be tested for Shut off test specified in **7.2**.

A.3.8 Each valves selected in accordance with column 2 of **Table 9** shall be tested for Dynamic pressure test specified in **7.3**.

A.3.9 Each valves selected in accordance with column 2 of **Table 9** shall be tested for Flow test specified in **7.4**.

A.3.10 Each valves selected in accordance with column 2 of Table 9 shall be tested for Endurance test specified in **7.5**.

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 workmanship & finish requirements.

A.4.6 Each valves inspected as in **A.3.6** satisfy the Hydraulic pressure test.

A.4.7 Each valves inspected as in **A.3.7** satisfy the Shut off test.

A.4.8 Each valves inspected as in **A.3.8** satisfy the Dynamic pressure test.

A.4.9 Each valves inspected as in **A.3.9** satisfy the Flow test.

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

A.5 TEST SEQUENCE

Tests and procedures to determine compliance with the requirement specified in 7.1, 7.2, 7.3, 7.4 & 7.5 shall be carried out on each individual Float operated valve in the following sequence,

1) Hydraulic pressure test
2) Shut off
3) Dynamic pressure

4) Flow test
5) Endurance

If any parameter which specified under test sequence is not satisfactory, balance test shall not carry out and decision may be taken by the lab.

ANNEX B
EQUIVALENT NOMINAL SIZES
(Informative)

Nominal size of float operated valves is designated as "DN" or "NPS" or "A". The equivalent DN numbers are given in **Table 10.**

Table 10 - Equivalent DN numbers for the float operated valves designated in "NPS" or "A"

DN	NPS	A
10	⅜	10
15	½	15
20	¾	20
25	1	25

ANNEX C
HYDRAULIC PRESSURE TEST

C.1 SCOPE

To establish that the design and strength of the assembly is adequate for the application by subjecting the fittings to pressure tests.

C. 2 TEST APPARATUS

C.2.1 Pressure system :

A hydraulic system capable of producing a test pressure of (2 $^{+0.4}_{-0}$ MPa) MPa without shock or pulsations. A hydraulic pump or accumulator may be used for this purpose. In case any internal leakage occurs during the test, the pressurizing system shall be capable of maintaining the pressure during these flow conditions.

C.2.2 Water supply :

A water supply system capable of maintaining the supply at the nominal ambient temperature (27 °C ± 2 °C).

C.2.3 Pressure gauge :

A digital or analog pressure gauges with an accuracy of ±0.5 % of the true value.

C.3 PROCEDURE

This test shall be conducted using water at ambient temperature. The procedure shall be as follows,

a) Mount the float operated valve and connect to the pressuring system.
b) Open the valve under test and the flow control valve, if applicable, and allow water to run and discharge freely to atmosphere for 10 $\pm^{+5}_{-0}$ minutes through the float operated valve. Ensure that all air is removed.
c) Immediately shut the valve (close the nozzle of end of test valve by pushing the piston towards the nozzle forcefully by pulling the lever stem upward) and pressurize the valve at its inlet to test pressure of (1.5 x PFA) $^{+0.4}_{-0}$ MPa.
d) Keep the system for minimum of $60\pm^{+15}_{-0}$ min with the same pressure.
e) Observe the valve body and check whether there is visible leakage or any type of mechanical defect such as cracks, swelling or breaking areas etc.

NOTE :

This test involve high pressure. Suitable protection shall be provided so that the operator is not exposed to a safety hazard if a burst failure occurs.

ANNEX D
SHUT OFF TEST

D.1 SCOPE

This Appendix sets out the method for testing float valves to ensure that the valve will shut off against a water pressure of designated pressure class.

D. 2 TEST APPARATUS

D.2.1 Pressurizing system :

A hydraulic system capable of producing a test pressure of 1.5 $^{-0.4}_{-0}$ MPa without shock or pulsations. A hydraulic pump or accumulator may be used for this purpose. In case any internal leakage occurs during the test, the pressurizing system shall be capable of maintaining the pressure during these flow conditions.

NOTE : *PFA = manufacture designated pressure*

D.2.2 Cistern (Storage tank) :

A cistern or storage tank with suitable mounting for the valve and large enough to enable the float to operate freely. An overflow shall be located at the appropriate air gap distance below the valve outlet.

D.2.3 Pressure gauge :

A digital or analog pressure gauges with an accuracy of ±0.5 % of the true value.

D.3 PROCEDURE

The Procedure shall be as follows,

a) Mount the float operated valve in the cistern, and mark the overflow level and the working water level on the cistern wall.
b) Adjust the water inlet valve to shut off below the working water level.
c) Connect the water supply and allow the cistern to fill. The valve shall shut off at or below the working level when the hydrostatic pressure is increased to the test pressure of (1.1 x PFA) MPa
d) Maintain the pressure for not less than 15 minutes to ensure that the water level has stabilized.
e) Mark the water level and maintain a pressure for another 15 minutes (total 30^{-10}_{-0} minutes.). Observe and report any increase in the water level or leakage through the valve under test.

ANNEX E
DYNAMIC PRESSURE TEST

E.1 SCOPE

This test ensures that the valve will perform against the maximum pressure likely to be encountered in public water supplies.

E.3 APPARATUS

The following apparatus is required:

1. Pressurizing system A hydraulic system capable of producing a minimum pressure of 1.5 +0.4, -0 MPa without shock or pulsation. A hydraulic accumulator or pump may be used for this purpose. In case any internal leakage occurs during the test, the pressurizing system shall be capable of maintaining the pressure during these flow conditions.

2. Cistern A cistern or other vessel with suitable mounting for the valve and large enough to enable the float to operate freely. An overflow shall be located at the appropriate air gap distance below the valve outlet.

3. Pressure *gauge* A digital or analog pressure gauge with an accuracy of $\pm$5% of the true value.

E.4 PROCEDURE

The procedure shall be as follows:

1. Mount the valve in the cistern and keep fully open position.

2. Gradually increase the supply pressure to designated class pressure.

3. Maintain this pressure for 60 +5, -0 s

APPENDIX F

FLOW TEST

F.1 LOW PRESSURE FLOW TEST

F.1.1. Apparatus

F.1.1.1. *A test rig* **(Figure 5**) capable of maintaining 1 ±0.1 m head of water at the seat of the valve under test, comprising a cistern connected, through diameter 15 mm, PVC pipework to the specimen valve via a controlling isolation valve.

F.1.2. PROCEDURE

Fit the float operated valve to be tested together with its discharge arrangement. Remove the float. Cause the valve to discharge water from cistern A into container B (see **Figure 5)** for a period of 140 **±** 5 s whist maintaining, for the duration of the test the water level in cistern A at a height of 1**±** 0.1 m above the center of the inlet of the valve.

F.1.3. Result

Record the amount of water in container B in liters, divide the amount in 140 s and calculate the flow rate.

Figure 13 – Flow test apparatus

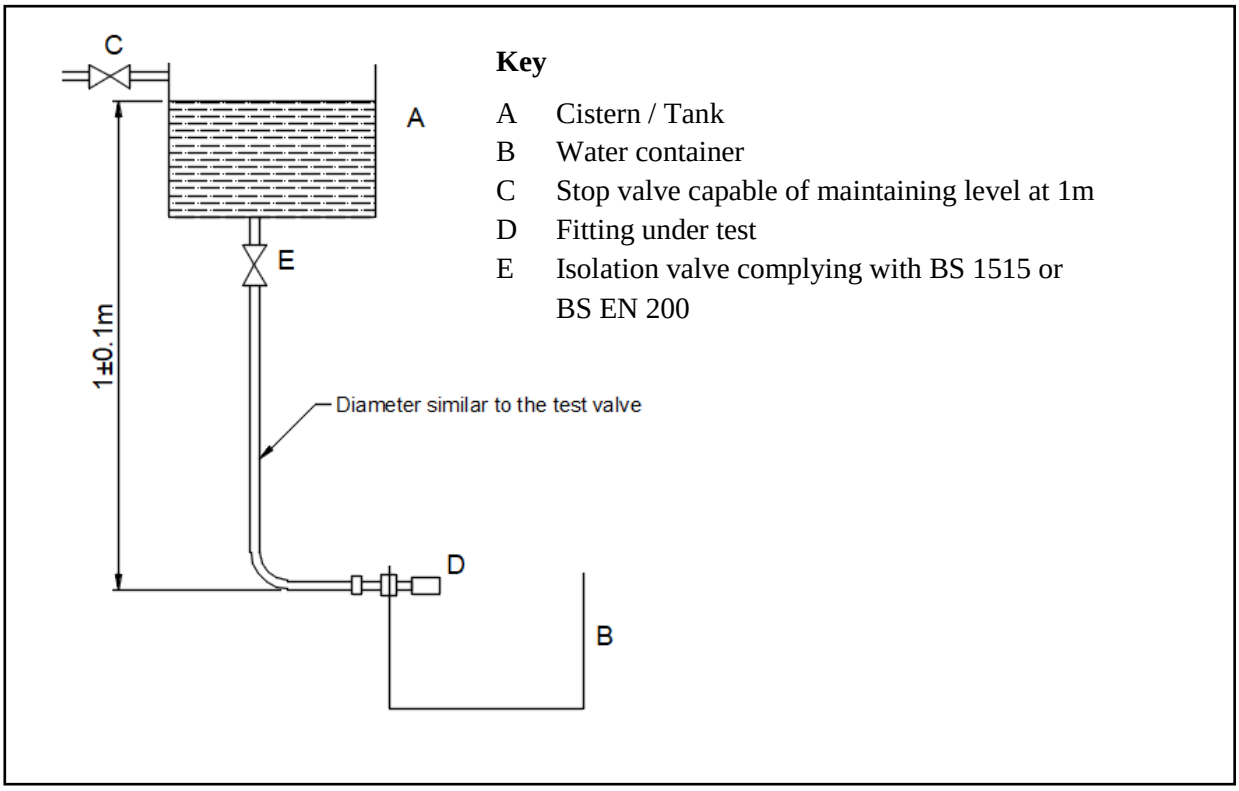


Figure 5 – Flow test apparatus

APPENDIX G

ENDURANCE TEST

G.1 SCOPE

The test measures the ability of valve to operate satisfactorily with normal opening and closing operations during the expected life of the valve.

G. 2 TEST APPARATUS

G.2.1 Test apparatus

A test apparatus fitted with a counter to register complete cycles and capable of the following performance:

(a) Fully opening and closing the valve over the entire extent of the valve's operating limits by manipulation of the float arm.

(b) Shut off the flow against the prescribed pressure when the valve is in the closed position by applying a force not less than that normally imposed by the float.

G.2.2 Water supply system

A water supply system capable of maintaining the supply at the nominal ambient temperature (27 °C ± 2 °C) under test. The system shall be capable of maintaining a hydrostatic pressure to the valve at a static pressure of (400 ±20) kPa when the valve is in the closed position**.**

G.2.3 Pressure gauge

A digital or analogue pressure gauge with an accuracy of ±2% of the true value.

G.2.4 Timing and control equipment

Timing and control equipment shall achieve a complete cycle as follows:

a) Fully open the valve.

b) Allow valve to remain fully open for a period of (2 +5), ± 0 s.

c) Fully close the valve.

d) Allow valve to remain fully closed for a period of (2 +5), - 0 s.

G.2.5 Monitors

The apparatus may be provided with continuous monitoring equipment to stop the tests if the parameters and limits are not being met. The apparatus may then be repaired or reset and the test continued.

If a manual system of monitoring the system's performance is used, one of the following actions shall be taken if it is found that the equipment is outside the set limits

(a) The test shall be abandoned and recommenced with a new valve.

(b) The equipment shall be repaired and reset, and the cycles continued. All the cycles, between the time of detection of the fault and the recorded cycle count at the last check when the equipment was operating correctly, shall be added to the required number of cycles.

G.3 PROCEDURE

The procedure shall be as follows:

a) Connect the valve assembly to the test rig.

b) Adjust the water supply pressure to (400 +20), —0 kPa with the valve under test in the closed position.

c) Commence the opening and closing cycling of the valve, and set the apparatus so that the valve opens to at least 90% of the fully open position and the opening and closing times are in accordance with **G.2.4.**

d) Reset the cycle counter to zero.

e) Then start to commence the cycling & continuing to a minimum of 200,000 cycles cycling.

f) Regularly check that the prescribed limits are being met throughout the test and also that the valve shuts off the water when closed. The apparatus may be turned off to perform this test. Record the results and the number of cycles at which these checks occur. The washer or diaphragm shall be replaced immediately the valve is found not to shut off the water. A valve washer may only be replaced once during an endurance test. A second failure will fail the valve under test. For other defects the test shall be aborted due to failure.

g) At the completion of minimum of 200,000 cycles, check the equipment for compliance with the parameters and limits of this test.

f) Remove the valve assembly and carry out the shut-off test in **Annex D**.

NOTE:

No repairs or part replacements shall be carried out before the final water shut-off test, except for the washer that may be replaced once during the cycling test. The gland may be adjusted provided that no adjustments have occurred during the cycling test.