Draft Sri Lanka Standard
WC AND URINAL FLUSHING CISTERNS

SLS XXXX: 202x

SRI LANKA STANDARDS INSTITUTION
No, 17, Victoria Place,
Elvitigala Mawatha,
Colombo 8,
SRI LANKA

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FOREWORD

This standard was approved by the Sectoral Committee on Building and Construction Materials and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 2021-XX-XX.

This standard is one of a series of standards for sanitary appliances and used for flushing water closets (WC) and urinals.

This document supersedes

SLS 864:1987 Specification for ceramic flushing cistern and

SLS 878:1989 Specification for plastic flushing cistern (low-level valveless, syphonic type with side connection)

WC and Urinal Flushing Cisterns are manufactured from vitrified ceramics, plastics and stainless steel.

This document has been prepared in response to request made by National Water Supply & Drainage Board as a part of their national programme on water conservation and introduction of quality water fittings to the market by regulation measures which implement under the directive and guidance of Public Utility Commission of Sri Lanka and Ministry of Water Supply.

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 figures retained in the rounded off value shall be the same as that of the specified value in this standard.

In the preparation of this standard the assistance derived from the publications of the European Committee for Standardization (CEN) is gratefully acknowledged.

1. SCOPE

This Standard specifies design, performance requirements and the test methods for WC and urinal flushing cisterns with flushing mechanism, inlet valve and overflow.
This document covers flushing cisterns designed to be connected to drinking water installations inside buildings.
This standard does not cover automatic valveless siphon flushing cisterns for flushing urinals.

NOTE:

Flushing cisterns for one-piece WCs and close-coupled suites are covered by SLS XXXX:2021 (EN 997)

2.REFERENCES

SLS ASTM A240/ A240M	-Chromium and Chromium -Nickel Stainless Steel Plate,Sheet,and Strip for Pressure Vessels and for General Applications
SLS EN 13618	- Flexible hose assemblies in drinking water installations- Functional requirements and test methods
SLS 102	- Rules for rounding off numerical values
SLS 229	- Specification for sanitary appliances (vitreous china)
SLS XXXX (=EN 997)	-WC pans and WC suites with integral trap
EN 14055	WC and urinal flushing cisterns
EN 1717	-Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow
SLS EN 13407:2006	-Wall-hung urinals — Functional requirements and test methods
BS 1212-2:1990 (SLS XX-PART 5)	Specification for compact type float operated valves for WC Cisterns (including floats)
SLS XX-PART 8)	Filling valves for WC Cisterns with internal overflow (including floats)

3.DEFINITIONS

For the purpose of this standard, the following definitions shall apply:

3.1 valve-type flushing cistern: Cistern with integral valve outlet device, for storage and discharge of a defined volume of flushing water for removal of excrement from a WC pan.

3.2 valveless-type flushing cistern: Cistern with integral siphonic actuated outlet device, for storage and discharge of a defined volume of flushing water for removal of excrement from a WC pan

NOTE:

Both types of flushing cisterns are available, as detailed below:

Wall-hung independent low-level

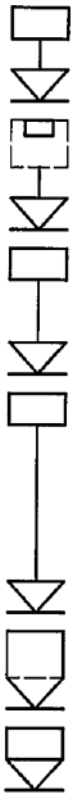
Built-in independent

Wall-hung independent mid-level

Wall-hung independent high-level

One-piece integral (with WC pan)

Close-coupled



3.3 close-coupled multiple use flushing cistern: Close-coupled flushing cistern for use with different WC pans.

3.4 independent flushing cistern: Flushing cistern mounted separately from a WC pan or urinal.

3.5 outlet valve: Mechanism for opening and closing the outlet orifice of the flushing cistern.

3.6 operating mechanism: Mechanism to open, and if applicable, close the outlet valve.

3.7 flush pipe: Connecting pipe between a flushing cistern's outlet and a WC's or urinal's inlet.

3.8 overflow: Device enabling release of excess water from a flushing cistern when water reaches a pre-determined level.

3.9 inlet valve: Valve that controls and shuts off the flow of water into a flushing cistern.

3.10 overflow level: Water level corresponding to the upper edge of the overflow or to the tower edge of the overflow notch.

3.11 maximum water level: Highest water level reached after flow stabilization, in the event of continuous supply, as a result of malfunction of the inlet valve.

3.12 critical water level: Highest water level in any part of the appliance, 2 s after the supply is cut off.

3.13 residual water level: Water level after a full flush is completed.

3.14 adjustable residual water level: Water level in a cistern, after (uninterrupted) flushing, when an outlet mechanism can be adjusted to the elevated residual water level.

3.15 meniscus level: level resulting from surface tension of water during overflowing.

3.16 nominal water level: water level when a flushing cistern is filled to the nominal flush volume.

3.17 nominal flush volume: volume of water indicated, when a flushing cistern is filled to the nominal water level.

3.18 flush volume: Volume of water discharged from the flushing cistern during a flush cycle.

3.19 safety margin c: Distance between the nominal water level determined by the manufacturer and the overflow level

3.20 flush rate: Volume of water flowing out of a flushing cistern as a function of time

3.21 test height: Distance between the seat of the outlet valve and the horizontal axis of the flush pipe

3.22 impact force: Force of the flushing water at the outlet of the flush pipe

3.23 flushing device: Device fitted to a cistern to provide controlled measured volume(s) of water to a WC pan or suite for flushing

3.24 water-saving device: Flushing device that permits a part of the total flush volume to be delivered, e.g. acting as double-action mechanisms (interruptible) or double-control mechanisms (dual control or dual flush)

3.25 warning level: Level of spillover of a vertically mounted warning pipe connection or the invert of a horizontally mounted warning pipe connection, or the level at which an equally effective (warning) device would operate

3.26 short-term leak test: Leak test consisting of a 15 min wait after flushing then positioning paper designed to change colour when wet, under the flushing device for 10 min
NOTE:
A leak is defined as being visible discharge of water amounting to more than three separate drops.

3.27 long-term leak test: Leak test consisting of a 2 h wait after flushing then positioning paper designed to change colour when wet, under the outlet for 15 min

NOTE:*A leak is defined as being visible discharge of water amounting to more than three separate drops.*

3.28 product type: Construction product with a set of representative performance levels or classes in relation to its Essential Characteristics, produced using a given combination of raw materials or other elements in a specific production process A_l

4 CLASSIFICATION

Flushing cisterns are classified as described below:

Type 1: Flushing cisterns tested in accordance with the requirements of Clauses 5 and 8 using a nominal flush volume range 4 1 to 9 1.

Type 2: Flushing cisterns tested in accordance with the requirements of Clauses 6 and 8 using a maximum flushing volume of 6 1, or a dual-flush which combines a maximum flush of 6 1 and a reduced flush no greater than two-thirds of the maximum flush.

Type 3: Type 1 flushing cistern intended to be used in connection with urinals.

5. REQUIREMENTS

5.1 Material Requirements

5.1.1 *General*

Cistern shells, siphons and associated components shall be made from materials which under the conditions of use are one of the following:

a)non corroding for example: plastics;
b)Protected against the types of corrosion caused by the action on them of the water with which the cistern is to be used.
c)Highly resistant to corrosion by the action of the water with which the cistern is to be used, i.e. they corrode only at a rate which is insufficient to affect adversely the durability or efficiency of the cistern.

Before dissimilar metals are used in the construction of a cistern, the manufacturer shall ensure the avoidance of possible electrolytic action.

5.1.2 *Specification for glazed* Vitrified *Ceramics*

Material and Manufacturing quality of the Glazed Vitrified Ceramic Cisterns, other than thickness shall be conformed to the SLS 229 :2021

5.1.3 *Specification for plastics*

Material and Manufacturing quality of the WC and Urinal Flushing Cisterns shall be as given in Appendix **C.**

5.1.4 *Specification for Stainless steel*

Material and Manufacturing quality of the WC and Urinal Flushing Cisterns shall be as given in Appendix **D.**

5.1.5 *Specification for Rubber compound*

Material and Manufacturing quality of the WC and Urinal Flushing Cisterns shall be as given in Appendix **E.**

5.2 Requirements for type 1 products

5.2.1 Design

5.2.1.1 Flushing cistern equipment

An equipped flushing cistern comprises:

—a shell, provided with a removable lid or an access flap allowing access to components;
—an inlet valve complying with SLS XX-PART 8
—a flushing device;
—an overflow device;
—an operating mechanism;
—a flush pipe, when the cistern is for use with an independent WC pan.

In special cases, a combined fitting providing the functions of filling, overflowing and evacuation is permissible. In this case, the fitting shall be designed to comply with the hygiene, physico-chemical, leak tightness, hydraulic, pressure resistance, acoustic and mechanical characteristics specified in SLS XX-PART 8). The tests shall be performed on the flushing cistern as supplied.

5.2.1.2 Water supply connection

The inlet valve can be connected to the cistern through:

—the side;
—the back;
—the underside;
—the top.

5.2.1.3 Supply piping

All materials of the supply piping which could be in contact with drinking water shall not be a danger to health. They shall not change the taste, aroma or visual appearance of the drinking water.

5.2.1.4 Removable parts

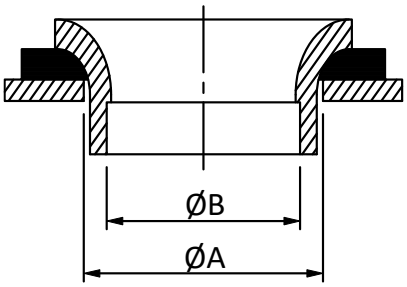
It shall be possible to dismantle removable parts, without having to remove the flushing cistern.

5.2.1.5 Connecting dimensions

The connecting dimensions shall comply with Table 1.

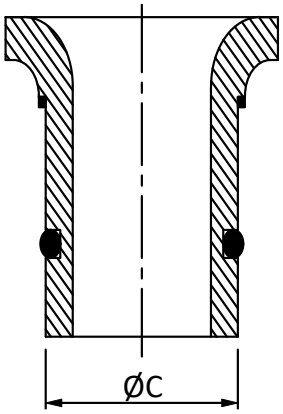
TABLE 1- Connecting dimensions (Figures 1 and 2)

Designation	Symbol	Dimensions mm	Remarks
Hole for inlet valve	-	19 ± 2 [C]	For inlet valves size 3/8 "
		23 ± 2 [C]	For inlet valves size ½ "
Hole for outlet valve	*A*	$63^{+2\ c}_{-3}$	For ceramic flushing cisterns
		$61^{+2\ c}_{0}$	For thin-walled flushing cisterns (e.g. plastic)
		$45^{+2\ c}_{-3}$	For high level flushing cisterns
Inside diameter of outlet connection	*B*	$32.5^{+1\ c}_{0}$	For flush pipes of design A
		$51^{+0.5\ c}_{0}$	For flush pipes of design B
Outside diameter of outlet connection	*C* [a]	$49.5^{+0.4\ b}_{0}$	For flush pipes of design C
Hole in the cover for operating device	-	$40^{+2\ c}_{-1}$	Recommended dimension
[a] Not applicable to flushing cisterns built into wall frames. [b] Where the exterior diameter of the flush pipe is conical or has several stepped diameters, the maximum diameter is to be verified and recorded. [c] Other dimensions are permissible if the performance of the cistern is assured.			



Key : See Table 1.

FIGURE 1 — Outlet connection for flush pipes of design A, B1 and B2



Key: See Table 1.

FIGURE 2 — Outlet connection for flush pipes of design C

NOTE:
Design B means design B1 and design B2.

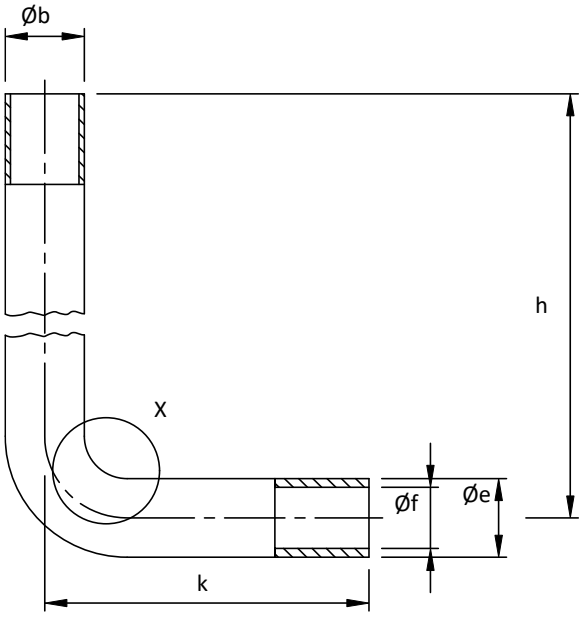
5.2.1.6 Flush pipes

The dimensions of flush pipes designed to equip WC pans for independent supply shall comply with Table **2**. The flush pipe shall be provided by the manufacturer of the flushing cistern.

TABLE 2 — Dimensions of flush pipes (Figures 3 to 6)

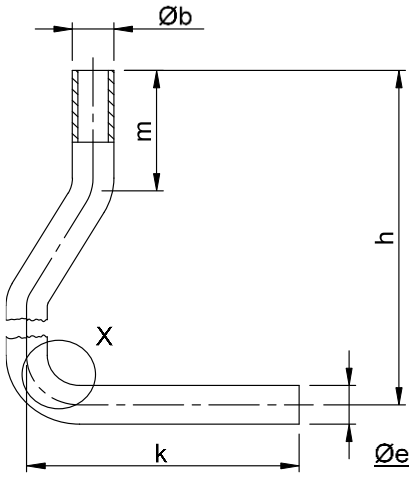
Designation	Symbol	Dimension mm	Remarks
Outside diameter inlet	b	$32_{0}^{+0.5}$	For flush pipes of design A
		$50_{0}^{+0.5}$	For flush pipes of designs Bl and B2
Inside diameter	c	50_{0}^{+1}	For flush pipes of design C
Outside diameter at outlet WC	e	$32_{0}^{+0.5}$	For flush pipes of design A and B
		$44_{0}^{+0.5}$	For flush pipes of design Bl
		$40_{0}^{+0.5}$	For flush pipes of design B2
		$45_{0}^{+0.5}$	For flush pipes of design C
Inside diameter at outlet WC	f	≥ 39	For flush pipes of designs Bl, B2 and C
Height of flush pipe	h	≥ 1 500	For flush pipes of design A
		≥ 165	For flush pipes of designs B1 and B2
		≥ 600	
		≥ 165	For flush pipes of design C
Length	k	≥ 210	For flush pipes of designs A, B1 and B2
		≥ 180	For flush pipes of design C
Length of vertical inlet portion	m	≥ 100	For flush pipes of design A
Radius of bend	r	50 to 80	For flush pipes of design A
		≥ 15	For flush pipes of designs B1 and B2
		≥ 5	For flush pipes of design C

Apart from dimension e other dimensions are permissible, provided the performance requirements in **5.2.2** are satisfied.



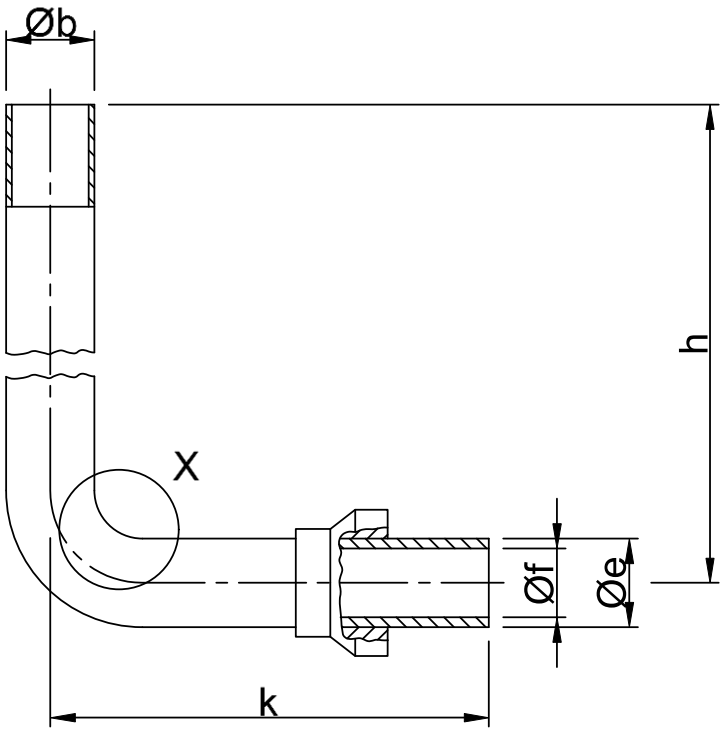
Key
See Table 2.

FIGURE 3 — Design A flush pipe for wall-hung high-level cisterns, fabricated in one or two parts



Key
See Table 2.

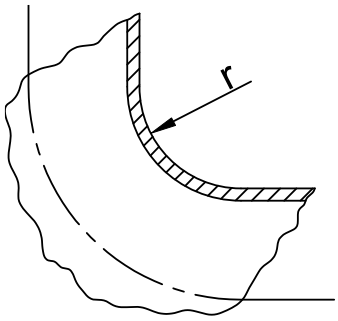
FIGURE 4 — Design B1 and B2 flush pipes for wall-hung low-level or mid-level cisterns



Key
See Table 2.

FIGURE 5 — Design C flush pipe for built-in cisterns

X



Key
See Table 2.

FIGURE 6 — Detail X

5.2.2 Hydraulic and mechanical characteristics

5.2.2.1 *Flush volume*

Flush volume(s) shall correspond with those specified in Table 3, when measured as described in **A.2.**

TABLE 3 - Flush volumes

Nominal flush volumes ***1***	**Flush volumes** ***l***			
	For complete flushing		**For water-saving (dual) flushing**	
	Minimum	**Maximum**	**Minimum**	**Maximum**
9.0	8.5	9.0	3.0	4.5 [a]
7.0	7.0	7.5	3.0	4.0 [a]
6.0	6.0	6.5	3.0	4.0 [a]
5.0	4.5	5.5	3.0	4.0 [a]
4.0	4.0	4.5	2.0	3.0 [a]
[a] Only for double-control water-saving (dual) flushing devices.				

Flushing cisterns or their components shall be marked to allow the correct volume(s) of flush to be achieved.

Flushing cisterns with a nominal volume range of 4 1 to 9 1 or can be used to deliver the different volumes shown in Table **3**. Adjustment can be effected at the inlet valve and/or the outlet mechanism. The manufacturer's instructions shall describe the procedure and the consequences (e.g. increase in the residual water level or decrease in the filling level).

5.2.2.2 *Water-saving devices*

Water-saving mechanisms shall be designed so that, when selected, only part of the total flush volume is delivered.
Water-saving mechanisms shall comply with the requirements specified below:
a) Double-action mechanisms (interruptible):
    1) one action initiates flushing; and
    2) a second action stops the flush.

Devices with immediate and automatic closing are not permitted.

b) Double-control mechanisms (dual control):
    1) one control releases the full flush volume; and
    2) another control releases a reduced flush volume.

Both devices shall deliver flush volumes and flush rates in accordance with Tables **3** and **4**.

5.2.2.3 *Flush rate and impact force*

When tested as described in **A.3** and **A.11**, the flush rate and the impact force shall comply with the values specified in Table **4**.

TABLE 4 - Flush rates and impact force

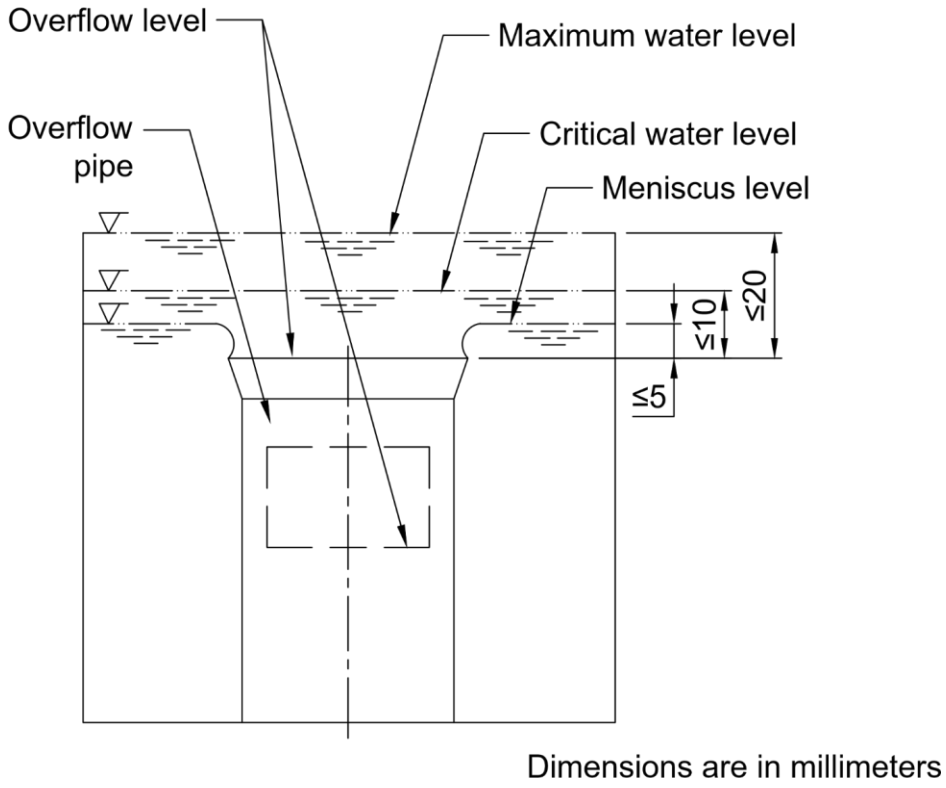
Type of flushing cistern	Test height mm	Impact force N	Flush rate for complete flush l/s
Independent wall-hung low-level using flush pipe of design B1	200 ± 5	-	2.4 ± 0.2
Independent wall-hung low-level using flush pipe of design B2	330 ± 5[d]	-	2.2 ± 0.2
Independent built-in	≥ 195[a]	-	2.2 ± 0.2
Independent built-in	< 195[a]	> 3.9 (defined by the maximum method) or > 3.7 (defined by the fixed time frame method)	2.2 ± 0.2
Independent wall-hung mid-level	565 ± 5	-	$1.8^{+\ 0.4}_{-\ 0.1}$
Independent wall-hung high-level	1 365 ± 5	-	$1.8^{+\ 0.4}_{-\ 0.1}$
One-piece and close-coupled	-	-	n.a. [b]
Multiple use close-coupled	-	-	Min. 2,0 [C]

[a] Flushing cisterns with integral flush pipes and flushing cisterns built into wall frames shall be tested as supplied by the manufacturer, regardless of the test height.
[b] One-piece and close-coupled type will be tested in accordance with SLS EN 997.
c Independent from this value, the flushing cistern shall be tested in accordance with EN 997 with dedicated WC pans specified by the manufacturer of multiple close-coupled flushing cisterns.
[d] This test height is valid for flush pipe of design B2 with outside diameter at outlet to WC of $40^{+\ 0.5}_{0}$ mm.

5.2.2.4 *Overflow*

When tested as described in **A.4**, the overflow shall be designed in accordance with the requirements specified below (see Figure **7**):

a) the distance between the maximum water level and the level of overflow shall be ≤ 20 mm;
b) the distance between the critical water level and the level of overflow shall be ≤ 10 mm;
c) the distance between the meniscus level and the level of overflow shall be ≤ 5 mm.



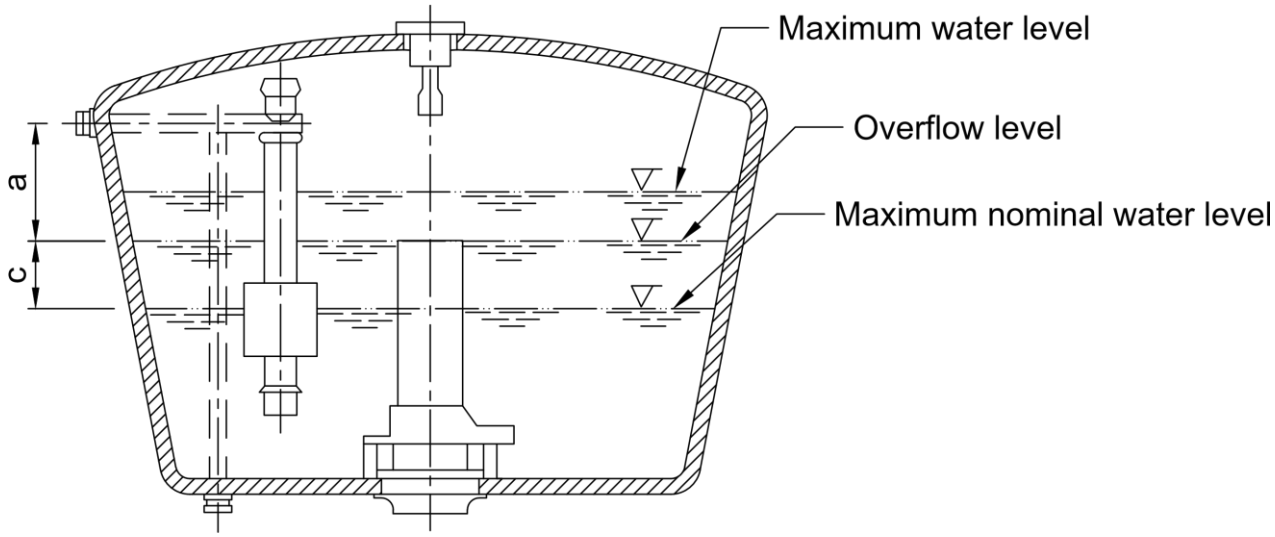
Key
1 overflow pipe
2 overflow level
3 maximum water level
4 critical water level
5 meniscus level

FIGURE 7 — Maximum, critical and overflow level

5.2.2.5 *Inlet valve opening characteristics for water saving flushing*

When tested as described in **A.5**, inlet valves used with flushing cisterns equipped with a water-saving device shall re-open during or after the short flush has been completed.

5.2.2.6 *Safety margin — Dimension "c"*
When tested as described in **A.6,** dimension "c" (see Figure **8**) corresponding to the distance between the overflow level and the maximum nominal water level indicated by the manufacturer shall be at least 20 mm.



Key
1maximum water level
2 overflow level
3 maximum nominal water level
a distance between overflow level and the point of the air inlet orifice of the inlet valve
c safety margin

FIGURE 8 — Safety margin dimensions

5.2.2.7 Backflow prevention, air gap, safety margin — Dimension "a"

When tested as described in **A.7,** the dimension "d" (see Figure **8**) between the overflow level and the lowest point of the air inlet orifice of the inlet valve shall be 20 mm minimum as required by **EN 1717** to prevent backflow.

In the case of adjustable overflow, the adjustment shall provide a dimension "a" of 20 mm minimum.

5.2.2.8 *Outlet valve leak tightness*

When tested in accordance with **A.8**, there shall be no leakage greater than three drops within 15 min.

5.2.2.9 *Outlet valve reliability*

When tested in accordance with **A.9**, the outlet mechanism functions shall be ensured.

The flushing device shall not show any failure or permanent distortion of any components including linkages that prevents normal operation of the mechanism.

The outlet of the flushing device shall not show leakage greater than three drops within 15 min.

5.2.2.10 Operating force

When tested as described in **A.10**, it shall be possible for the outlet mechanism to be actuated with a maximum force of 25 N.

5.2.2.11 Durability

Type 1 products conforming with **5.2.2.1, 5.2.2.3** to **5.2.2.9** are deemed to be durable.

5.3 Functional requirements for type 2 products

5.3.1 Inlet valve

Either the first inlet valve or, in the event of this failing, all four of the remaining inlet valves shall comply with SLS Floated operated valve part 5 or SLS Floated operated valve part 8 (=BS 1212-2, -3 or -4) subject to the amendments listed below:

—The water hardness during tests shall not exceed the range of (230 ± 20) ppm of calcium carbonate ($CaC0_3$) during the course of the test.

—The supply pressure for the endurance test shall be (0. 15 ± 0.01) MPa ((1.5 ± 0.1) bar).

—SLS FOV Part 5 valves shall be subject to an endurance test using a supply pressure of (0.15 ± 0.01) MPa ((1.5 ± 0.1) bar).

—The endurance test shall be undertaken for 200 000 cycles and, if the first inlet valve fails the test, the four valves subsequently tested shall alt satisfy the requirements.

5.3.2 Backflow prevention

When tested in accordance with the backflow prevention requirements of SLS Floated operated valve part 5 or SLS Floated operated valve part 8 respectively there shall be no evidence of backflow.

5.3.3 Marking of flushing cistern

Every flushing cistern, other than a pressure flushing cistern, shall be clearly marked internally with an indelible line to show the intended volume of flush, together with an indication of that volume. Discharge volume(s) shall be based on measurement from the water level in the cistern using the manufacturer's original equipment to the residual water level in the cistern on completion of a flush.

5.3.4 Warning pipe and overflow provision

When tested as described in **B.2**, every flushing cistern, not being a pressure flushing cistern, shall be fitted with a warning pipe connection arranged with the discharge level between 25 mm to 32 mm above the marked water level, or a no less effective device shall be provided. The top edge of any internal overflow shall be not less than 10 mm above the warning level.

5.3.5 Flush volume

5.3.5.1 Full flush

When tested as described in **B.3** with any adjustable flushing device set to deliver the maximum flush volume, the measured discharge shall on no occasion exceed 6 1.

5.3.5.2 Reduced flush

When tested as described in **B.3** with any adjustable flushing device set to deliver a reduced flush volume, the measured discharge shall on no occasion exceed two-thirds of the full-flush volume.

5.3.6 Flush rate

When tested as described in **B.4**, the mean flush rate of discharge per flush shall be 1.85 l/s for the full flush and 1.6 l/s for the reduced flush, if provided.

5.3.7 Physical endurance and leakage of flushing device

When tested as described in **B.5**, the flushing device shall not undergo any failure or permanent distortion of any components including linkages that prevents normal operation of the mechanism. No more than two instances of leakage are permitted. A leak is defined as being visible discharge of water amounting to more than three separate drops. If the first flushing device fails the test, the four devices subsequently tested shall all satisfy the requirements.

5.3.8 Chemical endurance of flushing device

When tested as described in **B.6**, there shall be:

—no dimensional alteration of any component greater than 1 mm or 5 % whichever is the lesser;
—no weight loss of any component greater than 1 g or 5 % whichever is the lesser;
—no visible sign of physical change such that performance is impaired;
—no deterioration in performance.

The flushing device shall not leak after undergoing a 3 000 cycle physical endurance test and the long-term leakage test.

5.3.9 Durability

Type 2 products conforming with **5.3.1, 5.3.5, 5.3.6, 5.3.7** and **5.3.8** are deemed to be durable.

5.4 Requirements and Test Methods for type 3 products

Urinal flushing cisterns shall fulfil and be tested in accordance with the test methods and requirements of **5.1** and **5.2.**

5.4.1 *Adjustment*

To assure that the functional unit, e.g. urinal and flushing cistern, meets the functional requirements of SLS EN 13407:2015+A1:2018, the manufacturer of the flushing cistern shall provide the installer with an instruction manual showing adjustments of the flush rate and the flush volume in accordance with the requirements of a particular urinal in the following ranges measured in accordance with SLS EN 13407:2015+A1:2018, Annex B:
a) the flush volume: < 5 l;
b) the flush rate: 0.4 l/s to 0.6 l/s.

5.5 Dangerous substances

Whenever dangerous substance regulations come into effect, dangerous substance test need to be performed.

When dangerous substance is determined as per the method described in relevant regulation, cisterns shall conform to the requirements given in the regulation.

6.MARKING

Minimum of following information shall be marked and appeared on WC and Urinal Flushing cisterns covered under this standard. All information shall be marked clearly by indelible line or scripts. Marking shall not be done by indenting.

Marking on Product

i. Brand name or Trade mark of the product
ii. Code declared by manufacturer to facilitate traceability

Marking on Packaging

i. Product Standard No.;
ii. Country of Manufacturer;
iii. Material type (Ceramic/Plastic /Stainless Steel)
iv. Type of WC and Urinal Flushing cisterns;
v. Flush volume

NOTE:
Attention is drawn to the certification facilities offered by the Sri Lanka Standards Institution. See the inside back cover of this standard.

7. SAMPLING

Where the compliance of a lot to the requirements of this standard is to be assessed based on statistical sampling and inspection, the sampling scheme given in **E.1** of Appendix **E** shall be applicable.

In case of sample required for independent tests, it shall be taken at the option of the end-user or his/her representative, before delivery or within one week after delivery of tiles as per the scheme given in Appendix **E**.

Where compliance with this specification is to be assured based on manufacturer's process control systems coupled with type testing and check tests or any other procedures, appropriate scheme of sampling and inspection shall be adopted.

8. COMPLIANCE OF A LOT

Compliance shall be in accordance with **E.3** of Appendix **E**

APPENDIX A
TEST METHODS FOR CLASS 1 PRODUCTS

A.1 General

The tests described are type tests (laboratory tests) and not quality control tests carried out during manufacture.

A.2 Flush volume

A.2.1 *General*

The flush volume(s) shall be as specified in Table **3**.
The flush volume(s) for one-piece and close-coupled cisterns supplied with a WC pan shall conform with the value(s) specified by the manufacturer.

A.2.2 *Determination of the full flush volume*

—Install the cistern on a firm flat horizontal or vertical surface as appropriate.
—Fill the flushing cistern via an inlet valve to the level indicated by the manufacturer.
—Shut off the supply.
—Operate the flushing mechanism control and collect the water delivered.
—Measure the volume using a calibrated container.
—Perform the test three times.
—If there are differences in the volumes delivered, calculate the arithmetic mean for the three volumes.
—In the case of flushing cisterns that provide a choice of flush volumes, the test shall be repeated for each of these flush volumes.

A.2.3 *Determination of the flush volume for water-saving devices*

A.2.3.1 Double-action water-saving devices

—Fill the flushing cistern via an inlet valve to the level indicated by the manufacturer.
—Shut off the supply.
—Operate the flushing mechanism control and stop the flush after 1.5 s whilst collecting the water delivered.
—Measure the volume using a calibrated container.
—Perform the test three times.
—If there are differences in the volumes delivered calculate the arithmetic mean for the three volumes.
—In the case of flushing cisterns that provide different flush volumes, the test shall be repeated for each of these volumes.

A.2.3.2 Double-control water-saving devices

—Fill the flushing cistern via an inlet valve to the level indicated by the manufacturer.
—Shut off the supply.

—Operate the control for the reduced flush volume and collect the water delivered.
—Measure the volume using a calibrated container.
—Perform the test three times.
—If there are differences in the volumes delivered, calculate the arithmetic mean for the three volumes.
—In the case of flushing cisterns that provide different flush volumes, the test shall be repeated for each of these volumes.

A.3 Flush rate

A.3.1 *Test apparatus*

a) For flushing cisterns equipped with a flush pipe, the test shall be carried out with the flush pipe using the height specified in Table 4.

For multiple-use close-coupled flushing cisterns, the test shall be carried out without a flush pipe.

b) A pressure sensor with the following characteristics shall be used:

1) measuring range from 0 MPa to 0.005 MPa (from 0 bar to 0.05 bar);
2) accuracy > class 1;
3) response time ≤ 10 ms;
4) acquisition rate ≥ 40 acquisitions per second.

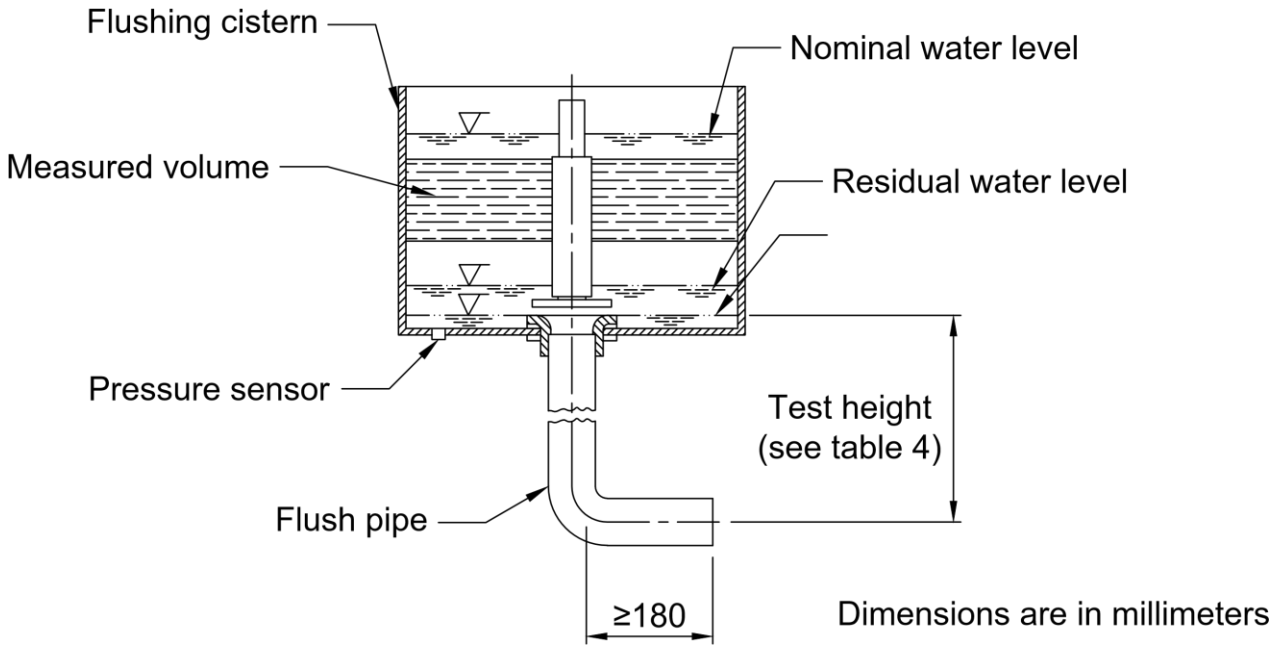


FIGURE A.1 — Test arrangement for testing low-level, mid-level and built-in flushing cisterns

A.3.2 *Determination of the residual water level*

—Fill the flushing cistern via an inlet valve to the water level indicated by the manufacturer.
—Shut off the supply.
—Operate the flushing mechanism.
—Record the residual water level, when flushing is completed.
—Perform the test three times.
—If there are differences in the levels obtained, record the highest residual water level.
—In the case of flushing cisterns with alternative flush volumes indicated, the residual water level shall be established for each volume.
—In the case of flushing cisterns having an adjustment of flushing volumes via the outlet valve, the increased residual water level shall be established and marked for each of the adjustable flushing water volumes.

A.3.3 *Establishing the measuring points to measure the flush rate*

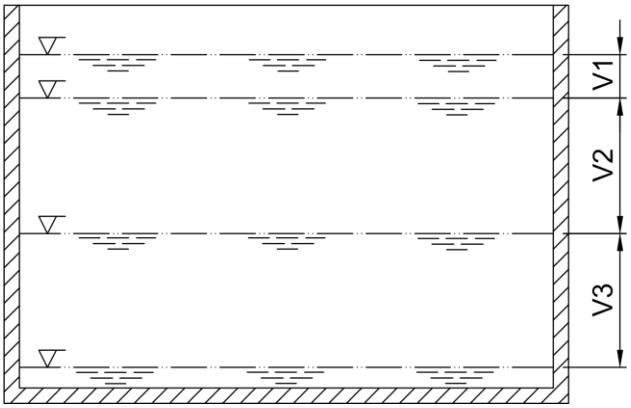
A.3.3.1 General

In order to measure the flush rate, it is necessary to establish the measuring points indicated in Figures **A.2**, **A.3** and **A.4**.

A.3.3.2 Flushing cisterns with an outlet valve adjustment for flushing volumes of 6 1, 7 1 or 9 1 respectively

The determination of the measuring points and the adjustment of the water level are illustrated in Figure **A.2**.

The choice of measuring points is significant for measuring the flush rate.



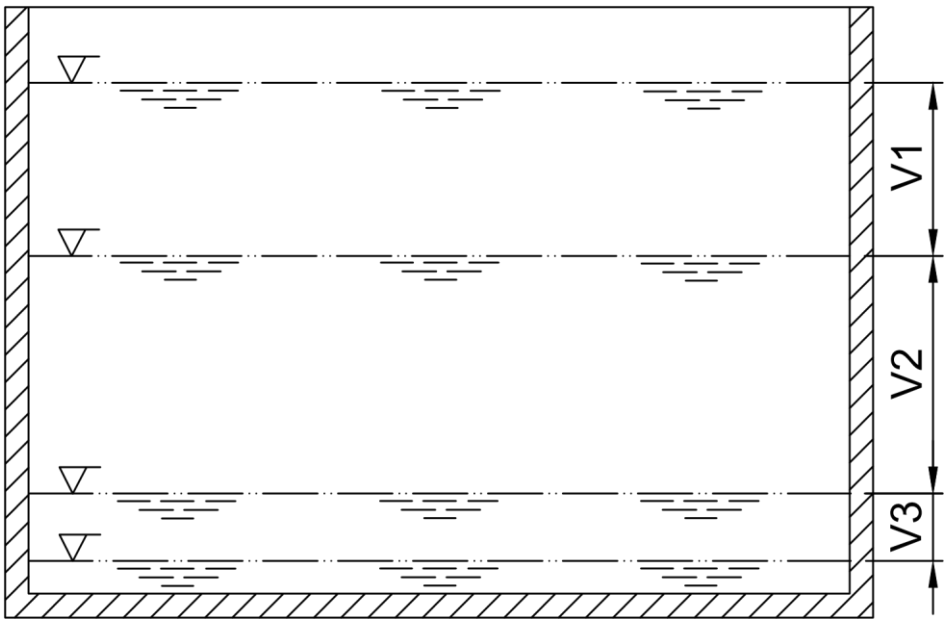
Key
V1 starting volume (full flush 1.0 1)
V2 measuring volume (full flush 3.0 1)
V3 finishing volume (full flush 2.0 l, 3.0 l,5.0.1)

FIGURE A.2— Flushing cisterns with an outlet valve adjustment for flushing volumes of 6 l, 7 1 or 9 1 respectively

A.3.3.3 Flushing cisterns with an inlet valve adjustment for flushing volumes of 6 l, 7 l or 9 l respectively

The determination of the measuring points and the adjustment of the water level are illustrated in Figure **A.3.**

The choice of measuring points is significant for measuring the flush rate.



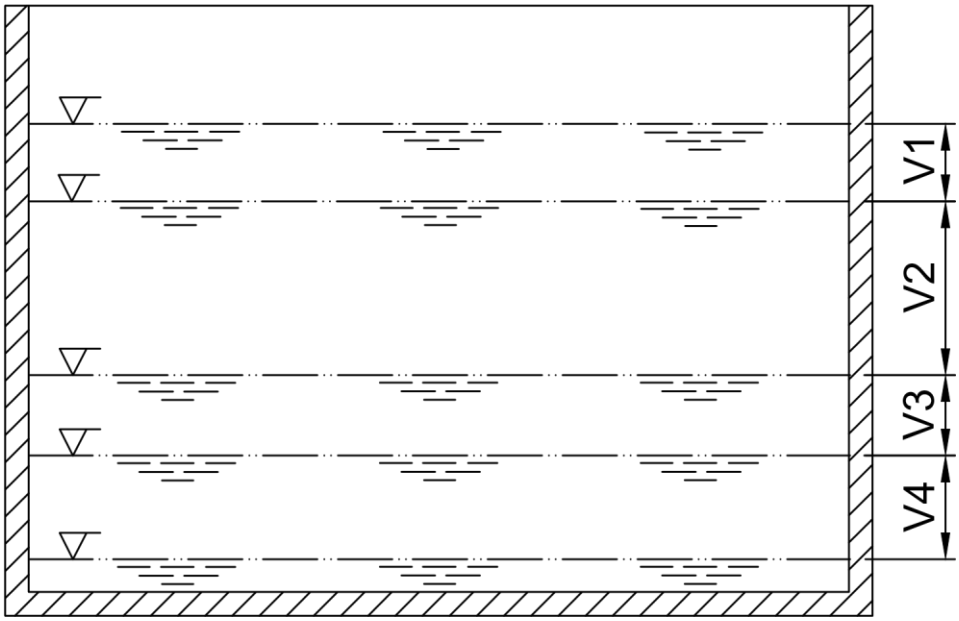
Key
V1 starting volume (full flush 1.0 1, 2.0 1, 4.0 1)
V2 measuring volume (full flush 3.0 1)
V3 finishing volume (full flush 2.0 1)

FIGURE A.3— Flushing cisterns with an inlet valve adjustment for flushing volumes of 6 1, 7 1 or 9 1 respectively

A.3.3.4 Flushing cisterns with a combined outlet/inlet valve adjustment flushing volume of 4.0 1 or 5.0 l respectively

Flushing cisterns with a combined outlet/inlet valve adjustment flushing volume of 4.0 1 or 5.0 1 and the determination of the measuring points and the adjustment of the water level are illustrated in Figure **A.4**.

The choice of measuring points is significant for measuring the flush rate.



Key
V1 starting volume (full flush 1.0 1)
V2 measuring volume (full flush ≥ 2.0 1)
V3 finishing volume (full flush 1.0 1)
V4 residual volume (full flush individual)

FIGURE A.4. — Flushing cisterns with a combined outlet/Inlet valve adjustment flushing volume of 4.0 1 or 5.0 1 respectively

EXAMPLE For a flush with 4 1 in a 7 1 flushing cistern:

Maximum adjustable flushing volume 7.0 1
Adjustment via the inlet valve to 5.5 1
Giving for full flush:

V1 = 1.0 1;

V2 = 2.0 1;

V3 = 1.0 1;

V4 = 1.5 1.

V4 being the volume remaining in the flushing cistern, controlled by the outlet valve.

A.3.3.5 Flushing cisterns having no flushing volume adjustment

For flushing cistern having no flushing volume adjustment, i.e. where the volume is permanently set to 4 1, 5 1, 6 1, 7 1 or 9 1, the measuring points and the setting of the water level shall be established or obtained by analogy with the description in **A.3.3.2** to **A.3.3.4.**
A.3.4 *Determination of flush rate*

A.3.4.1 General

For flushing cisterns providing the possibility of adjustment to different flushing volumes, the flush rate is to be measured at the adjustment corresponding to the lowest measuring points as **A.3.3.2** to **A.3.3.4.**

A.3.4.2 Flush rate for complete flushing

- Fill the flushing cistern via an inlet valve to the level determined as described in A.3.3.
- Shut off the water supply.
- Operate the flushing mechanism.
- Using the sensor established in the cistern as described in A.3.1, record the pressure/time curve.
- Extrapolate from the recording the flush rate between the measuring points established as described in A.3.3.
- The test shall be performed three times.
- The arithmetic mean of the three separate operations shall be taken as the flush rate.

A.4 Determination of the overflow capacity

- Record the overflow level.
- Supply the flushing cistern with a flush rate of 0,28 I/S for at least 60 s.
- In the case of a combined mechanism (inlet valve + flushing mechanism), supply the mechanism at a pressure of 0,6 MPa (6 bar) and force the inlet valve to be open for at least 60 s.
- Record the maximum water level when the level has stabilised.
- Shut off the water supply.
- Determine the water level 2 s after the water supply is shut-off (critical water level).
- Record the meniscus level after stabilisation.

A.5 Inlet valve opening characteristics

- Fill the flushing cistern using an inlet valve with a supply pressure of 0.3 MPa (3 bar) to the level(s) indicated by the manufacturer

- In the case of a double-action flushing cistern, stop the flush after (1.5 ± 0.2) s or in the case of a double control cistern, operate the reduced flush control.

- Verify opening of the inlet valve and re-filling of the cistern to the level(s) indicated by the manufacturer.

A.6 Determination of dimension “c”

Fill the flushing cistern using an inlet valve to the highest water level indicated by the manufacturer.

Measure dimension "c" representing the safety margin (see Figure **8**) between the maximum nominal water level and the overflow level.

A.7 Determination of dimension “a”

Determine dimension “a” (see Figure **8**) representing the distance between the lowest point of the inlet valve's air inlet orifice and the overflow level using the inlet valve manufacturer's marking as specified in SLS EN 14124.

A.8 Outlet valve leak tightness

−A flush pipe is not fitted for this test.
−Fill the flushing cistern to the water level indicated by the manufacturer. In the case of flushing cisterns with adjustable levels, the minimum level shall be used.
−Actuate the flushing mechanism and allow the flushing cistern to fill again.
−Leave the flushing cistern for a period of 2 h.
−Wipe the outlet orifice dry.
−Place a piece of paper under the flushing cistern.
−Leave for 15 min. Observe and record any watermarks on the paper.

In the case of double-control mechanisms, the test is to be repeated using the reduced flush volume.

A.9 Outlet valve reliability test

A.9.1 *Test apparatus*

The test apparatus comprises:

—a flushing cistern which shall be filled through an inlet valve or an alternative filling device to accelerate the test;

—an automatic system allowing the flushing mechanism to be activated with a controlled force in the range of 25 N to 30 N and with a velocity of 5 cm/s in a period of 0.5 s to 1 s for the duration of the test. The system shall ensure that the outlet valve is fully closed before the flushing cistern is refilled;

—a water supply with a temperature of $7\ ^{0}$C to $25\ ^{0}$C.

A flush pipe is not fitted for this test.

A.9.2 *Procedure*

The test shall be performed using the highest water level in the flushing cistern when several alternative water levels are indicated.

One cycle consists of:
a) Fill the flushing cistern to the highest indicated water level indicated by the manufacturer.

b) Actuate the flush operating control by means of the automatic system.

c) Allow the mechanism to close again.

d) Re-fill the flushing cistern.

e) In the case of single-flush devices, submit the cistern to 50 000 of these cycles (category l) or 200 000 of these cycles (category II).

f) In the case of double-control devices the test is carried out:

1)either: with three reduced flushes followed by a full flush for a total of 50 000 flushes (category l) or 200 000 flushes (category II);

2) or: with 37 500 reduced flushes followed by 12 500 full flushes (category l) or 150 000 reduced flushes followed by 50 000 full flushes (category II).

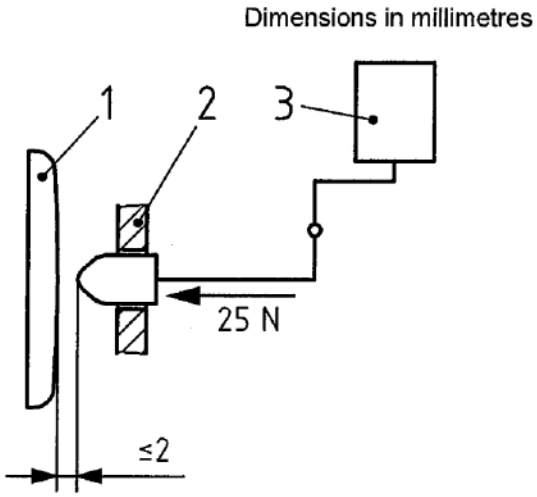
g) Record any failure or permanent distortion of the outlet valve during and at the end of the test.

h) 2 h after completing the cycles, verify the leak tightness in accordance with **5.2.2.8**.

A.10 Operating force

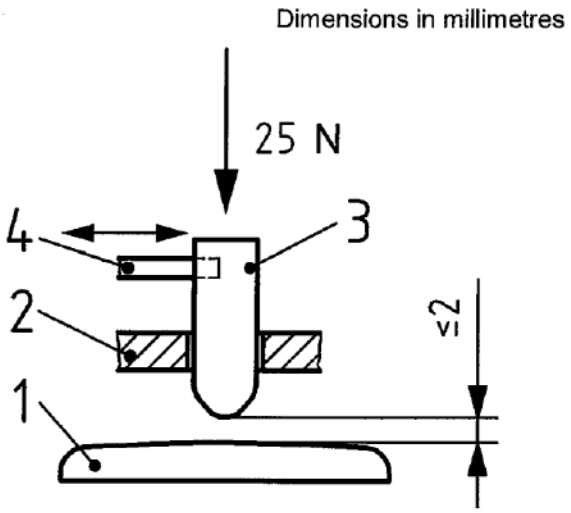
A.10.1 *Test apparatus*

Examples of typical test arrangements are shown in Figures **A.5** and **A.6**.



Key
1 push button or cistern operating mechanism
2 guide
3 test force

FIGURE A.5 — Test apparatus for vertical operation



Key
1 push button or cistern operating mechanism
2 guide
3 test force
4 release

FIGURE A.6 — Test apparatus for horizontal operation

A.10.2 Procedure

— Fill the flushing cistern to the maximum water level indicated by the manufacturer.

— Place the testing device 2 mm from the push button or cistern operating mechanism.

— Apply a maximum force of 25 N to the push button or cistern operating mechanism.

— Verify that the push button or cistern operating mechanism is activated within 0.5 s to 1 s.

A.11 Impact force

A.11.1 *General*

The impact force of the flushing cistern complete with the flush pipe according to Table 4 shall be measured with the test device shown in Figure **A.7**. The flushing water from the flush pipe shall be directed against the sensor plate (90 mm diameter) to create an impact force. This impact force shall be measured with a load cell and expressed in Newtons.

The test procedure consists of the measurement procedure and the calculation procedure using calibrated test equipment.

A.11.2 Test device

The test device shall meet the following requirements:

—The test device shall be in accordance with Figures **A.7** and **A.8.**

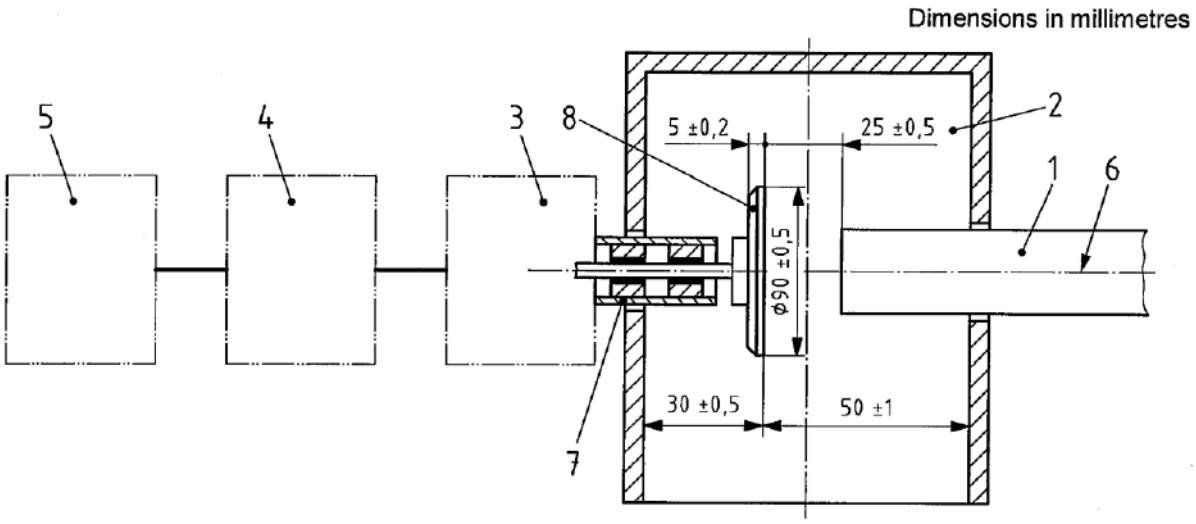
—The load cell [1)] shall have an accuracy of 0.2 g (C3 (OIML)) and a load capacity of 3 kg regardless of the mounting position.

—Measurement amplifier [2)] and load cell shall form one system.

—The measurement amplifier shall work with a sampling frequency of 600 Hz and a 100 Hz Bessel filter.

—The system (consisting of the measurement amplifier and load cell) shall have a tare function.

—The water used for the test shall have a temperature between $7\ ^{0}$C and $25\ ^{0}$C.

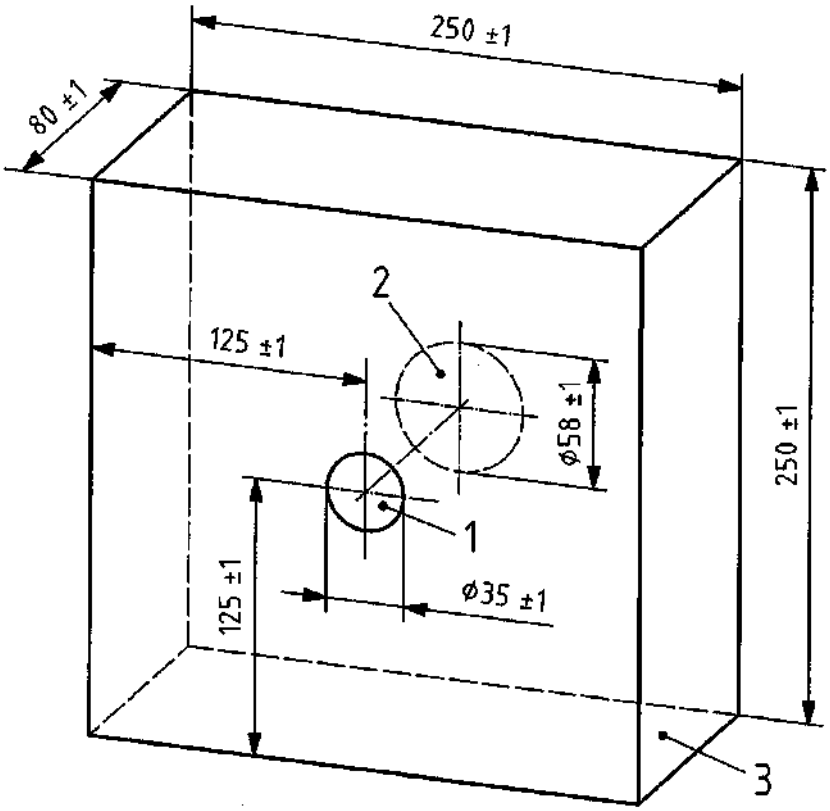


Key

1	flush pipe of the flushing cistern
2	splash guard (for details see Figure **16**)
3	load cell unit
4	measurement amplifier for data acquisition
5	computer for recording and evaluating the measurement data (with suitable software [3)])
6	the centre axis of the flush pipe shall be in line with the centre axis of the sensor plate.
7	the mechanical connection between the sensor plate and the load cell shall be suitable for the correct function of the load cell. It is recommended to have short distances to the load cell and sufficient adequate bearings.
8	sensor plate

FIGURE A.7— Test device to measure the impact force

Dimensions in millimetres



Key

1 hole diameter: (35 ± 1) mm for fixing the sensor plate including the mechanical connection to the load cell to the front of the splash guard
2 hole diameter: (58 ± 1) mm for fixing the flush pipe (position 1 of Figure **A.7**) to the back of the splash guard
3 wall thickness minimum 5 mm

NOTE:
Dimensions shown are internal dimensions.

FIGURE A.8— Splash guard

It is not permissible to use other test equipment than the one shown in Figure **A.7**.

A.11.3 *Procedure for calibrating the load cell unit and the measurement amplifier*

The test device (see Figure **A.7** except position 1) with all its components assembled shall be calibrated in its testing position with a force of 4 N.

A.11.4 *Measurement procedure*

1) Check and record the correct horizontal alignment of the flush pipe and the vertical alignment of the flushing cistern (see position 6 of Figure **A.7**).
2) Record the water temperature.
3) Set the load cell unit and the measurement amplifier to zero by using the tare function of the system.
4) Start the recording of the impact force measurement values with a resolution of 600 Hz.
5) Activate the flushing device for full flush with an activating speed of 14 cm/s. In the case of non-manually (e.g. electronic) activated outlet valve, the activating speed is not applicable.
6) Stop the recording of the measurement data after the complete flush.
7) Export the measurement data (time and force) into a table calculation file and store the data.
8) Repeat the procedure (3) to 6)) a further nine times (ten measurements).

A.11.5 Calculation procedure for fixed time frame 0.35 s to 0.5 s

1) Open the recorded measurement data.
2) Set the time point zero of the flush where the force signal exceeds 0.5 N for the first time and number this point with 1.
3) Number the datasets to point 299 beginning with the time point zero.
4) Calculate the average of the 90 force values from point 210 (0.35 s) to point 299 (0.5 s).
5) Record average of the 90 force values as the impact force of this measurement.
6) Evaluate the impact force for each measurement by repeating the procedure (1) to 5)) a further nine times.
7) Calculate the average of the ten tests (of 6)) to two decimal places the result of which is the impact force of the flushing cistern.
8) Record the impact force of the flushing cistern.

A.11.6 Calculation procedure for maximum impact force

1) Open the recorded measurement data.
2) Set the time point zero of the flush were the force signal exceeds 0.5 N for the first time and number this point with 1.
3) Determine the arithmetic average value of each possible 60 consecutive measuring values.

EXAMPLE

$$\overline{F_1} = \frac{1}{60}\sum_{i=1}^{60} F_i \qquad \overline{F_2} = \frac{1}{60}\sum_{i=2}^{61} F_i \qquad \overline{F_3} = \frac{1}{60}\sum_{i=3}^{62} F_i$$

Where

$\overline{F_1}$ is the arithmetic mean of the impact force calculated out of the measurement point 1 to 60, in newtons;

$\overline{F_2}$ is the arithmetic mean of the impact force calculated out of the measurement point 2 to 61, in newtons;

$\overline{F_3}$ is the arithmetic mean of the impact force calculated out of the measurement point 3 to 62, in newtons;

$\overline{F_i}$ is the specific impact force of a measuring point, in newtons.

4) The impact force of this measurement is the maximum of all the average values.
5) Record the impact force of this measurement.
6) Evaluate the impact force for each measurement by repeating the procedure (1) to 5)) a further nine times.
7) Calculate the average of the ten tests (of 6)) to two decimal places, the result of which is the maximum impact force of the flushing cistern.
8) Record the impact force of the flushing cistern.

APPENDIX B
TEST METHODS FOR TYPE 2 PRODUCTS

B.1 Inlet valve tests

B.1.1 *Apparatus*

Apparatus as specified in SLS XXXX part 5 or SLS XXXX part 8 subject to the additional requirements specified in **5.3.1**.
Supply pressure requirements for pressurized cisterns shall conform to the manufacturer's recommendations.

B.1.2 *Procedure*

Subject the inlet valve to the tests as specified in SLS XXXX part 5 or SLS XXXX part 8 as appropriate. In testing against SLS XXXX part 5 or SLS XXXX part 8 if the first inlet valve fails, four further valves shall be tested.

B.1.3 *Expression of results*

Record whether the inlet valve complied with the requirements of **5.3.1**. For the test given in SLS XXXX part 5 or SLS XXXX part 8 (as modified in **5.3.1**), record whether the first inlet valves, or all four of the subsequent inlet valves, met the requirements.

B.2 Warning pipe and overflow provisions

B.2.1 *Test Apparatus*

B.2.1.1 Flushing system with warning pipe connection or a device deemed to be no less effective and internal overflow, if provided, installed in accordance with the manufacturer's instructions.
B.2.1.2 measuring device with an accuracy of ± 0.1 mm;
B.2.1.3 water supply controlled by a stop valve.

B.2.2 *Procedure*

Set the flushing system level. Fill with water to the nominal static water level marked by the manufacturer. Measure the distance from the water level to the warning level, i.e. the invert of a side connection warning pipe connection or the top of a bottom connection warning pipe connection. If appropriate, measure the distance from the warning level to the top of any internal overflow.

B.2.3 *Expression of results*

Record compliance or any failure to comply with the requirements of **5.3.4.**

B.3 Flush volume and water trap seal tests

B.3.1 *Apparatus*

B.3.1.1 Flushing cistern, complete with fitments including flush pipe and cover, installed in accordance with the manufacturer's instructions, on a firm, flat, vertical surface;
B.3.1.2 measuring vessel capable of collecting the flush volume;
B.3.1.3 water supply controlled by a stop valve;

B.3.2 *Procedure*

Set the dual-flush control or setting if provided, to the full-flush volume in accordance with the manufacturer's instructions. Connect the water supply to the flushing cistern and fill to the marked water line. Operate the flushing mechanism three times, completing three flushing cycles. Fill the cistern to the water line. Shut off the water supply, unless essential for the normal operation of the flushing device.

NOTE:
Where a water supply is essential for the normal operation of the device, the supply should be maintained at a hydraulic pressure of (0.15 ± 0.01) MPa or the minimum required to operate the device, whichever is the greater.

Operate the flushing device and collect the water in the measuring vessel. Record the volume of water collected. Repeat the procedure a further four times.

Reset the dual-flush control or setting, if provided, to the reduced-flush volume and repeat the procedure five times.

B.3.3 *Expression of results*

Measure the volume of water collected in the measuring vessel after each flush cycle and record compliance or any failure to comply with the requirements of **5.3.5.**

B.4 Flush rate test
B.4.1 *Apparatus*

B.4.1.1 Flushing cistern, complete with fitments including flush pipe and cover, installed in accordance with the manufacturer's instructions on a firm, flat, vertical surface;

B.4.1.2 calibrated measuring container;
B.4.1.3 fluid level sensing devices;
B.4.1.4 electronic timer;
B.4.1.5 water supply controlled by a stop valve;
B.4.1.6 power supply.
B.4.2 *Procedure*

Set the dual-flush controller or setting, if provided, to the full-flush volume in accordance with the manufacturer's instructions. Connect the water supply to the flushing cistern and fill to the marked water line. Shut off the water supply, unless essential for the normal operation of the flushing device.

NOTE:
Where a water supply is essential for the normal operation of the device, the supply should be maintained at a hydraulic pressure of (0.15 ± 0.01) MPa or the minimum required to operate the device, whichever is the greater.

Operate the flushing device completing one flushing cycle. On completion of the flush, using the calibrated measuring container, add 0.5 1 of water to the cistern. Locate and position a fluid sensing device at the water level in the cistern. Using the calibrated measuring container add further water to the cistern equivalent to the volume of full-flush recorded in **B.3.3** less 1.0 l. Locate and position a second fluid sensing device at the water level in the flushing cistern. Add further water to the cistern up to the marked water level for the full-flush volume. Connect the two fluid level sensing devices to the electronic timer and connect to the power supply. Operate the flushing device and on completion of the flush, record the time taken to discharge the volume of water between the fluid level sensing devices as displayed on the timer. Repeat the procedure a further four times.

If the flushing device is provided with a reduced flush facility, shut off the water and power supplies and operate the flushing mechanism. Using the calibrated container, add to the cistern a volume of water equivalent to the difference between the full-flush volume and reduced-flush volume as recorded in **B.3.3**. Add a further 0.5 1. Locate and position a fluid level sensing device at the water level in the cistern. Using the calibrated measuring container add further water to the cistern until it is filled to a volume equivalent to the volume of full-flush recorded in **B.3.3** less 1.0 1. Locate and position a second fluid sensing device at this water level in the flushing cistern. Add further water to the flushing cistern, up to the marked water level for the full flush volume recorded in **B.3.3.** Turn on the power supply. Set the dual-flush controller or setting to the reduced-flush volume in accordance with the manufacturer's instructions. Operate the flushing device and, on completion of the flush, record the time taken to discharge the volume of water between the fluid level sensing devices as displayed on the timer. Repeat the procedure a further four times.

B.4.3 *Expression of results*

From the five recorded times, at each flush volume, determine the average time and, using the following formula, calculate the mean rate of discharge using the following methods.

For the full-flush

$$\frac{\text{Volume of discharge per full flush in litres (recorded in } \mathbf{B.3.3}\text{) - 1.0 } l}{\text{Average time in seconds (recorded in } \mathbf{B.4.3}\text{)}}$$

For the reduced-flush

$$\frac{\text{Volume of discharge per reduced flush in litres (recorded in } \mathbf{B.3.3}\text{) - 1.5 } l}{\text{Average time in seconds (recorded in } \mathbf{B.4.3}\text{)}}$$

B.5 Physical endurance and leakage test of flushing device

B.5.1 *Test Apparatus*

B.5.1.1 Flushing Cistern, complete with fitments including flushing device, flush pipe and cover, installed in accordance with the manufacturer's instructions;
B.5.1.2 Means of operating the flushing limiter activator automatically in accordance with the manufacturer's instructions;
B.5.1.3 Water supply maintained at a hydraulic pressure of (0.15 ± 0.01) MPa ((1.5± 0.1) bar), or the minimum pressure required to operate the flushing device whichever is the greater; having maintained water hardness not greater than the range (230 ± 20) ppm as calcium carbonate ($CaCO_3$) during the course of the test;
B.5.1.4 Paper of a type which changes colour when wet.

B.5.2 *Procedure*

Connect the water supply. For a single flush flushing device operate the flushing device and, if appropriate, allow the flushing cistern to re-fill. Carry out the long-term leak test. Three drops or more observed on the paper shall be considered a leak. Initiate automatic operation of the flushing device. Carry out the short-term leak test and inspect the flushing device after a further 2, 5, 10, 50, 100, 500, 1 000, 10 000 and every subsequent 10 000 cycles. If a leak is detected, the leak test interval, but not the test itself, shall restart (e.g. the short-term leak test shall be undertaken after a further 1, 2, 5, 10, etc. cycles). Continue until 200 000 test cycles have been completed, and then subject the flushing device to the long-term leak test. If, at any point during the test, three leaks have been detected, the test terminates and four further flushing devices shall be subjected to the same test, which again terminates if three leaks have been detected for any one of the flushing devices.

For flushing devices with reduced flush option, operate the flushing device for a full-flush and, if appropriate, allow the cistern to re-fill. Carry out the long-term leak test. Three drops or more observed on the paper shall be considered a leak. The test then continues with the sequence three reduced o flushes activated followed by a maximum flush. The flushing device shall be subject to the short-term leak test after 2, 5, 10, 50, 100, 500, 1 000, 10 000 and every subsequent 10 000 flushes (maximum and reduced flushes each counting as one flush). If a leak is detected, the leak test interval, but not the test itself, shall restart (e.g. the short-term leak test shall be undertaken after a further 1, 2, 5, 10, etc. cycles). Continue until 200 000 test cycles have been completed, and then subject the flushing device to the long-term leak test. If at any point during the test, three leaks have been detected, the test terminates and four further flushing devices shall be subjected

to the same test, which again terminates if three leaks have been detected for any one of the flushing devices.

The flushing device shall be inspected for wear at the same frequency as the short-term leak test. If the flushing device or any of its operating linkages suffers structural failure that affects operation, the test terminates.

B.5.3 *Expression of results*

Record compliance, or any failure to comply, with the requirements of **5.3.7**.

B.6 Chemical endurance test of flushing device

B.6.1 *Apparatus*

B.6.1.1 Weighing scales having a resolution of 0.1 g and an accuracy of ± 0.05 g;
B.6.1.2 Micrometer having a resolution of 0.1 mm and an accuracy of ± 0.05 mm;
B.6.1.3 Test solution (100 ml of domestic chlorine-based bleaching agent, consisting of up to 5 % sodium hypochlorite (NaClO) and anionic surfactants to every 900 ml of water);
B.6.1.4 Container.

B.6.2 *Procedure*

Dismantle the flushing device and weigh all seals, plungers, pistons or other components that initiate and stop water discharge and measure and record the principle dimensions; e.g. external diameter and thickness. Re-assemble the components and place the complete assembly in the container filled with test solution. Ensure that the assembly is covered by at least 100 mm depth of test solution. Leave for a period of (90 ±2) days. Remove from the test solution and rinse under clean water.

WARNING — Appropriate precautions should be taken when using chlorine based agents. Do not touch raw crystals or the stock solution, or allow these to come into contact with clothing or easily combustible materials.

Subject the flushing limiter to a 3 000 cycle endurance test using the long term leak test after the first and last cycles, and check for leaks.

B.6.3 *Expression of results*

Record compliance, or any failure to comply with the requirements of **5.3.8**.

B.7 Requirements for compatibility testing of type 2 products

This sub clause provides background notes on the testing and compatibility of elements of WC suites. Type 2 flushing cisterns are intended for use in Type 2 WC suites as specified in SLS XXXX:202X (=EN 997).

NOTE:
*Reference should be made to (SLS XXXX, **B.11.**) extracts from which are reproduced below.*

Inlet valves shall satisfy SLS XXXX part 5 or SLS XXXX part 8 as modified in **5.3.1**.

Flushing devices shall satisfy the requirements with regard to physical and chemical endurance. They shall also be capable of satisfying the flush volume test at full and, if appropriate, reduced flush volumes. They should also be capable of contributing towards the other requirements when tested in combination.

Flushing cisterns shall consist of compliant components and so satisfy warning pipe and overflow provisions and the flush volume test. They should also be capable of contributing towards the other requirements when tested in combination.

It should be noted that, when undertaking tests involving more than one component of a WC suite, components which could adversely affect the results of the whole test should not be changed without restarting that test.

APPENDIX C
SPECIFICATION FOR RUBBER COMPOUND AND PLASTICS

C.1 General

Plastic materials and rubber compounds shall be such that, when assembled, the cistern shall comply with **C.2** to **C.8**

C.2 Appearance

The cistern shall be free from blisters and delamination and reasonably free from flow lines,contamination,streaking or unintended colour variations on surfaces visible after installation.

C.3 Colour fastness to light

The colour fastness to light of the cistern and cover shall be not less than 5 when determined in accordance with ASTM G154 and 155 Xenon Arc

C.4 Opacity

When tested in accordance with **SLS ISO 7686**, the cistern and cover shall not transmit more than 0.2% of the visible light falling on them.

C.5 Distortion resistance

The cistern, when tested in accordance with **C.9.1**,shall not bulgd more than 6 mm and the cover shall not be dislodged.

C.6 Dead load test.

The complete cistern,when installed and filled as described in **C.9.1** and tested by the application of a load of 23 kg for 30 s , shall not distort to such an extent that any part becomes detached.

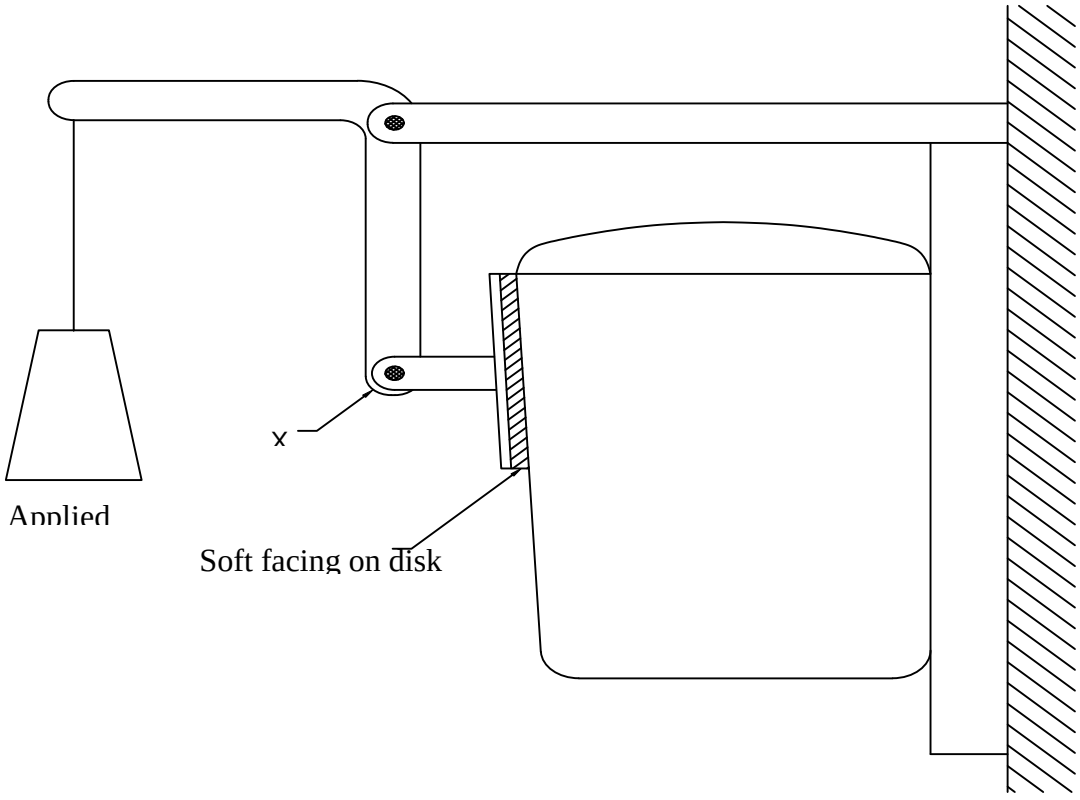
C.7 Front thrust test. For cisterns for use at low levels (including close coupled).

The complete cistern,when installed and filled as described in **C.9.1** and tested by the method described in **C.9.2**,shall notdistort to such an extent that any part becomes detached or inoperable.

C.8 Impact test.
The complete cistern,when installed and filled as described in **C.9.1** and tested as described in **C.9.3**,shall show no defect after one impact ,and after being emptied shall show no defect after one more impact.

C.9 Test Methods

C.9.1 *Distortion and dead load tests*
Fasten the cistern,complete with its fitments and cover ,by its normal fixing devices to a solid background.Fill the cistern with water to the marked water line Apply the dead load 6 mm from the end of the operating lever arm for 30 s.
C.9.2 *Front trust test*
Apply horizontally a front trust of 110 N through a 150 mm diameter disk as high up as possible to the front of the cistern on its centre line.Face the disk with a soft material such that the face will conform to the contour of the cistern shell. Ensure that the cistern cover is in position during the test .A convenient method of applying this thrust is shown in Figure **C1**.



NOTE:
Applied weight to be adjusted to give a horizontal trust of 110 N.This can be determined initially by a spring balance at "X".

FIGURE C1 – Front thrust test apparatus

C.9.3 *Impact test*
Suspend a 1 kg ball by a fine wire 2.5 m long, the point of suspension being located vertically over the point of impact. Release the ball from a point directly in front of the cistern at a horizontal distance of 1 m away from the point of impact, the point of impact being 75 mm from

the bottom and on the centre line of the cistern. Carry out the test at ambient temperature or, in case of dispute, at (20 ± 2) ^{0} C. Ensure that the cistern cover is in position during the test.

APPENDIX D
SPECIFICATION FOR STAINLESS STEEL

D.1 General
Stainless steel shall be Type 316, or 321 Complying with SLS ASTM A240M

D.2 Thickness
The thickness of stainless steel sheet for cisterns shall be not less than 1.2 mm.

D.3 Surface finish (internal and external)
Stainless steel shall be polished to at least a satin finish as a minimum.

D.4 Construction
Where welding is employed, the welding materials shall be compatible with the material to be welded. Welds shall be free of cracks and pits, and shall be ground and polished internally and externally. Any joins shall be made so that their strength is not less than that of the parent material and shall be free from crevices and folds.

APPENDIX E

SAMPLING AND CRITERIA FOR CONFORMITY

Samples shall be drawn from each lot as per the sampling scheme and shall be tested separately for ascertaining the conformity of the lot to the requirements of this specification.

E.1 SCALE OF SAMPLING

E.1.1 The number of appliances to be selected from the lot shall be in accordance with column **2** of Table **E1.** The appliances shall be selected at random. In order to ensure randomness of selection, random number tables as given in **SLS 428** shall be used.

TABLE E1 – Scale of sampling

Number of appliances in a lot (1)	**Number of appliances to be selected (2)**	**Permissible number of defects (3)**
Up to15	3	0
16 to 25	5	0
26 to 50	8	0
51 to 90	13	0
91 to 150	20	1
151 to 280	32	1
281 to 500	50	2
501 and above	80	3

NOTE
*The Table **E1** was prepared in accordance with **ISO 2859-1:1999**, General inspection level II AQL=1.5%.*

E.1.2 When the tests are required to be performed on regulatory requirement/s, the additional sub sample/s of size/s given in test method/s specified by the relevant regulation/s shall be selected as appropriate, in addition to the samples selected as per **E.1.1**.

E.2 NUMBER OF TESTS

The number of samples of WC and urinal flushing cisterns to be tested/assessed shall be in accordance with **E.2.1 and/or E.2.2**

E.2.1 The number of samples for type 1 products

Each Appliance selected as in **E.1.1** shall be inspected for following *Functional* requirements as appropriate;

E.2.1.1 Flushing cistern equipment **(***see* **5.2.1.1),**
E.2.1.2 Water supply connection **(***see* **5.2.1.2),**
E.2.1.3 Supply piping**(***see* **5.2.1.3**)
E.2.1.4 Mechanical components *(see* **5.2.1.*4*)**
E.2.1.5 Connecting dimensions *(see* **5.2.1.*5***)
E.2.1.6 Flush pipes *(see* **5.2.1.*6***)
E.2.1.7 Flush volume*(see* **5.2.2.1*)***
E.2.1.8 Water saving devices *(see* **5.2.2.2*)***
E.2.1.9 Flush rate and impact force *(see **5.2.2.3***)
E.2.1.10 Overflow*(see* **5.2.2.4*)***
E.2.1.11 Inlet valve opening*(see* **5.2.2.5**)
E.2.1.12 Safety margin-dimensions "c"*(see* **5.2.2.6*)***
E.2.1.13 Backflow prevention*" (see* **5.2.2.7*)***
E.2.1.14 Outlet valve leak tightness *see* **5.2.2.8***)*
E.2.1.15 Outlet valve reliability *(see* **5.2.2.9*)***

E.2.1.16 Operating force *(see* **5.2.2.10***)*

E.2.1.15 Durability *(see* **5.2.2. 11*)***
E.2.1.15 Dangerous substances *(see* **5.5*)***

E.2.1.16 Marking requirements *(see* **6***)*

E.2.2 The number of samples for type 2 products

Each Appliance selected as in **E.1.1** shall be inspected for following *Functional* requirements as appropriate;

E.2.2.1 Inlet valve*(see* **5.3.1)**
E.2.2.2 Backflow prevention *(see* **5.3.2)**
E.2.2.3 Flushing cistern marking *(see **5.3.3*)**

E.2.2.4 Warning pipe and overflow provision *(see **5.3.4**)*
E.2.2.5 Flush volume(s)*(see **5.3.5**)*
E.2.2.6 Flush rate*(see **5.3.6**)*
E.2.2.7 Flushing device: Physical endurance and leakage *(see **5.3.7**)*
E.2.2.8 Flushing device: Chemical endurance *(see **5**.3.8)*
E.2.2.9 Solids discharge and after flush volume for maximum flush *(see **5.3.9**)*
E.2.2.10 Dangerous substances *(see* **5.5***)*

E.2.2.11 Marking requirements *(see* **6***)*

E.2.3 The number of samples for type 3 products

Each Appliance selected as in **E.1.1** shall be inspected for following *Functional* requirements as appropriate;

E.2.3.1 Flushing cistern equipment **(***see* **5.2.1.1),**
E.2.3.2 Water supply connection **(***see* **5.2.1.2),**
E.2.3.3 Supply piping**(***see* **5.2.1.3**)
E.2.3.4 Mechanical components *(see* **5.2.1.*4*)**
E.2.3.5 Connecting dimensions *(see* **5.2.1.*5***)
E.2.3.6 Flush pipes *(see* **5.2.1.*6***)
E.2.3.7 Flush volume*(see* **5.2.2.1***)*
E.2.3.8 Water saving devices *(see* **5.2.2.2***)*
E.2.3.9 Flush rate and impact force *(see **5.2.2.3***)
E.2.3.10 Overflow*(see* **5.2.2.4***)*
E.2.3.11 Inlet valve opening*(see* **5.2.2.5**)
E.2.3.12 Safety margin-dimensions "c"*(see* **5.2.2.6***)*
E.2.3.13 Backflow prevention*" (see* **5.2.2.7***)*
E.2.3.14 Outlet valve leak tightness *see* **5.2.2.8***)*
E.2.3.15 Outlet valve reliability *(see* **5.2.2.9***)*

E.2.3.16 Operating force *(see* **5.2.2.10***)*

E.2.3.17 Durability *(see* **5.2.2.11***)*
E.2.3.18 Adjustment *(see* **5.4.1)**
E.2.3.19 Dangerous substances *(see* **5.5***)*

E.2.3.20 Marking *(see* **6***)*

E.3 CRITERIA FOR CONFORMITY

E.3.1 A lot shall be declared as conforming to the requirements of this standard, if the conditions given below are satisfied.

E.3.1.1 When the WC and urinal flushing cisterns inspected in accordance with **E.2.1, E.2.2**, and/or **E.2.3**, number of defectives conform to the corresponding acceptance number given in column **3** of Table **E1**.