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SPECIFICATION FOR PLASTIC FLUSHING CISTERN (LOW-LEVEL VALVELESS, SYPHONIC TYPE WITH SIDE CONNECTION)

SRI LANKA STANDARDS INSTITUTION

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FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on ..89/12/28.., after the draft, finalized by the Drafting Committee on ~~sanitary appliances~~ was approved by the Civil Engineering Divisional Committee.

In Sri Lanka, flushing cisterns of valveless type are commonly used for flushing water closets (WC) and urinals.

The use of plastic materials is now established as suitable for cisterns. The use of possible new plastic materials is adequately covered by the physical tests requirements which have proved effective in ensuring a satisfactory performance.

This standard does not cover the requirements for pressed steel cisterns, ~~lead-lined cisterns, copper-lined cisterns wood-cased cisterns and ceramic~~ cisterns.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the results of a test or an observation shall be rounded off in accordance with CS 102. The number of significant figures to be 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 considerable assistance obtained from the publications of the British Standards Institution is gratefully acknowledged.

1 SCOPE

This specification covers the requirements for water closet plastic flushing cisterns with valveless siphons, nominally 9.1 (litres) for low level.

2 REFERENCES

BS	2782	Method of testing plastics
CS	102	Presentation of numerical values
SLS	428	Random sampling method

3 GENERAL REQUIREMENTS

3.1 Cistern shells shall be made from plastic materials

3.2 Siphons and associated components shall be made from materials which have atleast one of the following properties ;

a) non corroding for example : plastic;
b) high resistances to corrosion by the action of water with which the cistern is to be used, (copper or copper alloy)
c) protected against the type of corrosion caused by the action of water with which the cistern is to be used. (plastic coated materials).

3.3 Dissimilar metals

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

4 REQUIREMENTS FOR PLASTIC MATERIALS

4.1 Rubber compound and plastic cistern

4.1.1 General

Plastic materials and rubber compounds shall be such that, when assembled the cistern shall comply with 4.1.2 to 4.1.8.

4.1.2 Appearance

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

4.1.3 Colour fastness to light

Colour fastness to light of the cistern and cover shall be not ldss than 5 when determined in accordance with BS 2782 Method 530A.

4.1.4 Opacity

When tested in accordance with BS 2782 Method 540A the cistern and cover shall not transmit more than 0.2 per cent of the visible light falling on them.

4.1.5 Distortion resistance

The cisterns when tested in accordance with Appendix A shall not bulge more than 6 mm and the cover shall not be dislodged.

4.1.6 Dead load test

The complete cistern when installed and filled as described in Appendix A and tested by the application of a dead load of 23 kg for 30 seconds shall not distort to such an extent that any part becomes detached.

Contd....3/-

4.1.7 Front thrust test for cisterns for use at low level (including close coupled)

The complete cistern, when installed and filled as described in Appendix A and tested by the method described in Appendix B shall not distort to such an extent that any part becomes detached or inoperable.

4.1.8 Impact test

The complete cistern, when installed and filled as described in Appendix A and tested as in Appendix C shall show no damage after one impact, and after being emptied shall show no damage after one more impact.

5 FLUSHING APPARATUS

The cisterns shall have a replaceable flushing apparatus of the valveless siphonic type. It shall be so constructed to flush directly once the mechanism is operated when the water is at the water line (Figure 1) and shall be so constructed that water cannot flow down the flush pipe except while a flush is being properly delivered.

Flushing apparatus shall be detachable from the shell and suitable means shall be provided for ensuring and maintaining a watertight joint. Any joint in the siphon assembly shall be watertight.

6 FLUSHING MECHANISM

The flushing mechanism shall be operated by a handle or by a push button of metal or plastic. The distance between the central axis of the handle and the end of it shall not be more than 100 mm.

The length of the lever arm between the fulcrum and the piston rod shall be such that there is no permanent distortion of the flushing apparatus when the lever is operated (Figure 1).

7 FLUSHING PIPE CONNECTION

The centre of the outlet shall be central in ~~which~~ width and shall be fitted with a connection to suit the type of flush pipe required.

8 VOLUME OF DISCHARGE PER FLUSH

The cisterns shall discharge 9 litres nominally, and the range shall be 8.0 to 9.5 litres, when tested according to the procedure described in Appendix D.

9 PERIOD OF DISCHARGE

The cisterns shall discharge the volume specified in 8 in not more than 6.5 seconds, when tested according to the procedure described in Appendix E.

10 WATER LINE

The water line shall be marked permanently inside the cistern in such a position that it is easily visible with the lid removed.

contd.....4/-

11 SPILL OVER LEVEL

Spill over level of the cistern shall not be less than 60 mm above the water line.

12 OVER FLOW OR WARNING PIPE

12.1 General

Each cistern shall be provided with a warning pipe connection so arranged that the invert of the side connection is not less than 25 mm or more than 32 mm above the water line.

12.2 Inlet and warning pipes

Cisterns shall be supplied with unions, to suit the connection of an inlet and a warning pipe of not less than 19 mm internal diameter, complete with a backnut. The union shall be manufactured from copper, copper alloy or plastic materials.

13 FLOAT OPERATED VALVES

13.1 The cistern shall be capable of accommodating a size 1/2 float operated valve where the flow of water is controlled by the flexing of a diaphram and which incorporates or is fitted with a discharge component to conduct the water into the cistern. (in operation flow from the valve reduces as the water level rises towards shut-off water level.)

13.2 When fitted in the cistern, the centre line of the inlet of the float operated valve shall not be lower than the horizontal centre line of a side connection warning pipe.

13.3 When the float operated valve is fitted in the cistern, it shall be possible to adjust it to close when the water reaches the water line.

14 SHELL

The minimum internal width at the top of the cistern shell from centre to centre shall be 425 mm. Any internal taper towards the base of the shell ~~should~~ shall not prevent free movement of the float.

The centres of the holes shall be on the same level, and the holes shall have the same diameter, namely 28^{+2}_{-1} mm.

Any aperture in the shell for operating lever or push button shall not be less than 10 mm above the overflow level.

15 MARKING

Flushing cisterns shall be marked clearly and indelibly at a place visible after the installation with the following :

a) name and trade mark of the manufacture, and

b) batch number or code or date of manufacture.

contd.....5/-

Flushing cisterns may also be marked with certification mark of the Sri Lanka Standards Institution on permission being granted for such marking by the Sri Lanka Standards Institution.

NOTE - "Attention is drawn to certification facilities offered by SLSI, see the inside back cover of this standard".

16 SAMPLING

16.1 Lot

In any consignment all the flushing cisterns belonging to one batch of manufacture or supply shall constitute a lot.

16.2 Scale of sampling

16.2.1 Samples shall be tested from each lot for ascertaining its conformity to the requirements of this specification.

16.2.2 Number of cisterns to be selected from a lot shall be in accordance with the following table.

Table - Scale of Sampling

Number of cisterns in the lot (1)	Number of cisterns to be selected (2)	Number of sub samples to be selected (3)
Upto 50	5	2
51 to 90	8	2
91 to 150	10	2
151 to 280	15	3
281 and above	20	3

16.2.3 The cistern shall be selected at random. In order to ensure randomness of selection, tables of random numbers as given in SLS 428 shall be applied.

16.3. Number of test

16.3.1 Each cistern selected as in coloumn 2 of 16.2.2 shall be inspected for general requirements, flushing apparatus, impact test, distortion resistance dead load test, front thrust test, volume of discharge per flush, rate of discharge, float operated valves and marking requirements,

16.3.2. A sub sample of size as given in coloumn 3 of the table shall be selected as in 16.2.2. and shall be individually tested for flushing mechanism, flush pipe connection, spill over level, warning pipe and shell.

16.3.3 If the tests carried out in 16.3.2 are satisfied, then select one cistern used in 16.3.2 and test for appearance, colour fastness to light opacity and water line.

contd....6/-...

16.4 Criteria for conformity

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

16.4.1 Each cistern inspected as in 16.3.1 satisfies the relevant requirements.

16.4.2 Each cistern tested as in 16.3.2 satisfies the relevant requirements.

16.4.3 The cistern tested as in 16.3.3 satisfies the relevant requirements.

APPENDIX A

DISTORTION AND DEAD LOAD TESTS

Fasten the cistern completely with its fitments and cover by its normal fixing devices to a rigid background. Fill the cistern with water to the marked waterline. Apply the dead load 6 mm from the end of the operating lever arm for 30 s.

APPENDIX B

FRONT THRUST TEST

Apply horzontally a front thrust of 110 N through a 150 mm diameter disc as high up as possible to the front of the cistern on its centre line. Face the disc with a soft material such that it will conform to the contour of the cistern shell. Ensure that the cistern oover is in position during the test.

A convenient method of applying this thrust is shown in the figure 3.

APPENDIX C

IMPACT TEST

Suspend a 1 kg steel ball by a fine wire 2.5 m long the point of suspension being 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. Ensure that the cistern cover is in position during the test.

APPENDIX D

VOLUME OF DISCHARGE TEST

D.1 PREPARATION

Fasten the cistern, complete with its fitments and float operated valve by its normal fixing devices to a rigid background. Connect a flush pipe of diameter 35 mm with other dimensions as shown in Fig. 4.

Connect water supply that is controlled by a stop valve and is fitted, if necessary, with a pressure regulating valve to give a static pressure of 300 ± 50 kPa at the inlet to the cistern float operated valve. Adjust the float operated valve so that the valve closes when the water level reaches the marked water line of the cistern. Fit the cistern cover with its fastening screws, if provided.

Place a vessel under the open end of the flush pipe.

contd.....8/-

D.2 METHOD

Ensure that the water supply stop valve is closed and that no water enters the cistern during the test. Operate the flushing mechanism and on completion of the flush, determine either by measuring or weighing, whether the volume discharged meets the requirements of 8.

APPENDIX E

RATE OF DISCHARGE TEST FOR FLUSH

E.1 PREPARATION

See D.1 for details of preparation

E.2 METHOD

E.2.1 General

Ensure that the water supply stop valve is closed and that no water enters the cistern during the test. Operate the flushing mechanism and start a stop watch just, as the water appears at the open end of the flush pipe.

At the end of 6.5 s or a computed prorata period if the volume of discharge is less than 9.1, rapidly draw the vessel clear or otherwise divert the flow of the water and ascertain, either by measuring or weighing, the volume of water collected in the vessel (see 9).

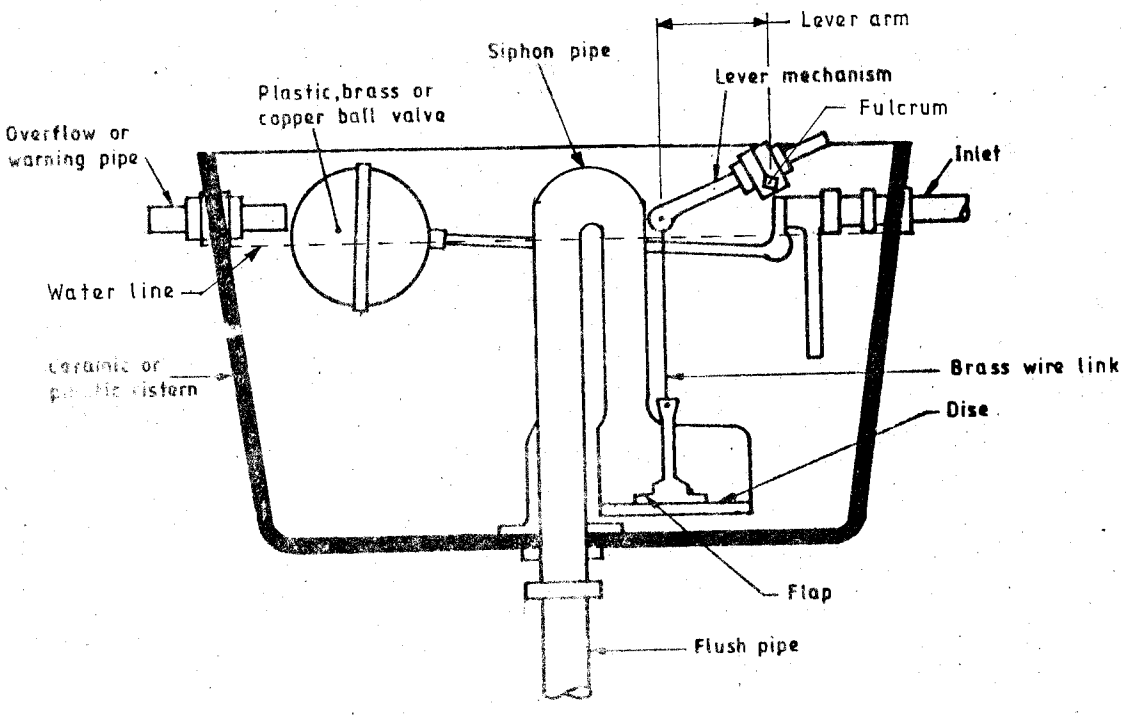


FIGURE 1 - Low-level flushing cistern

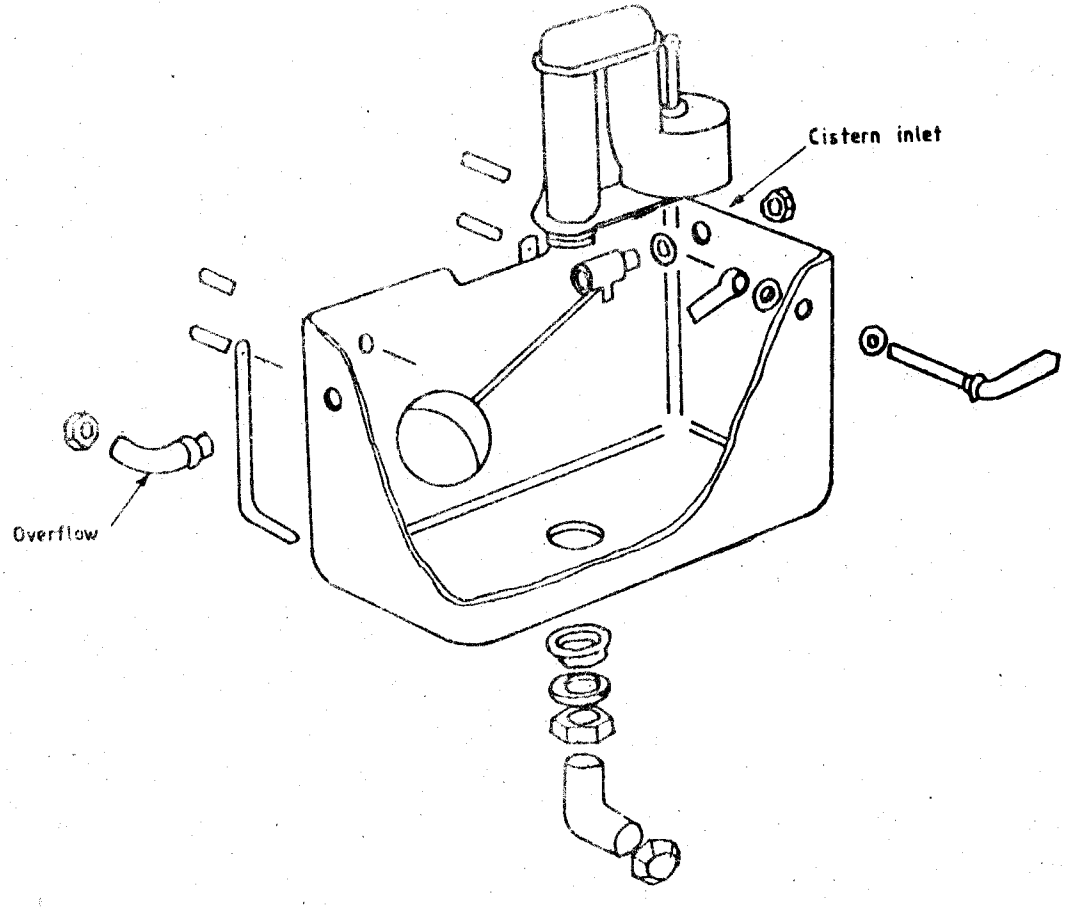
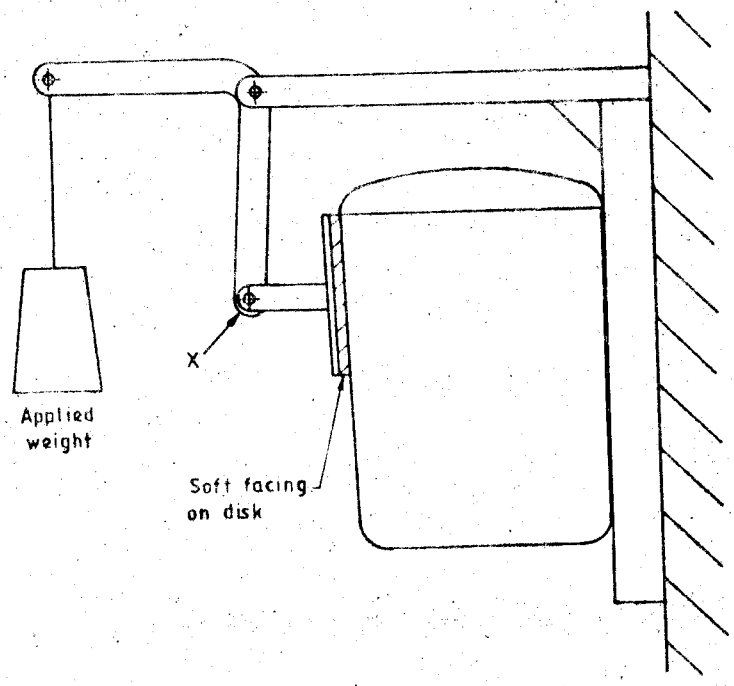
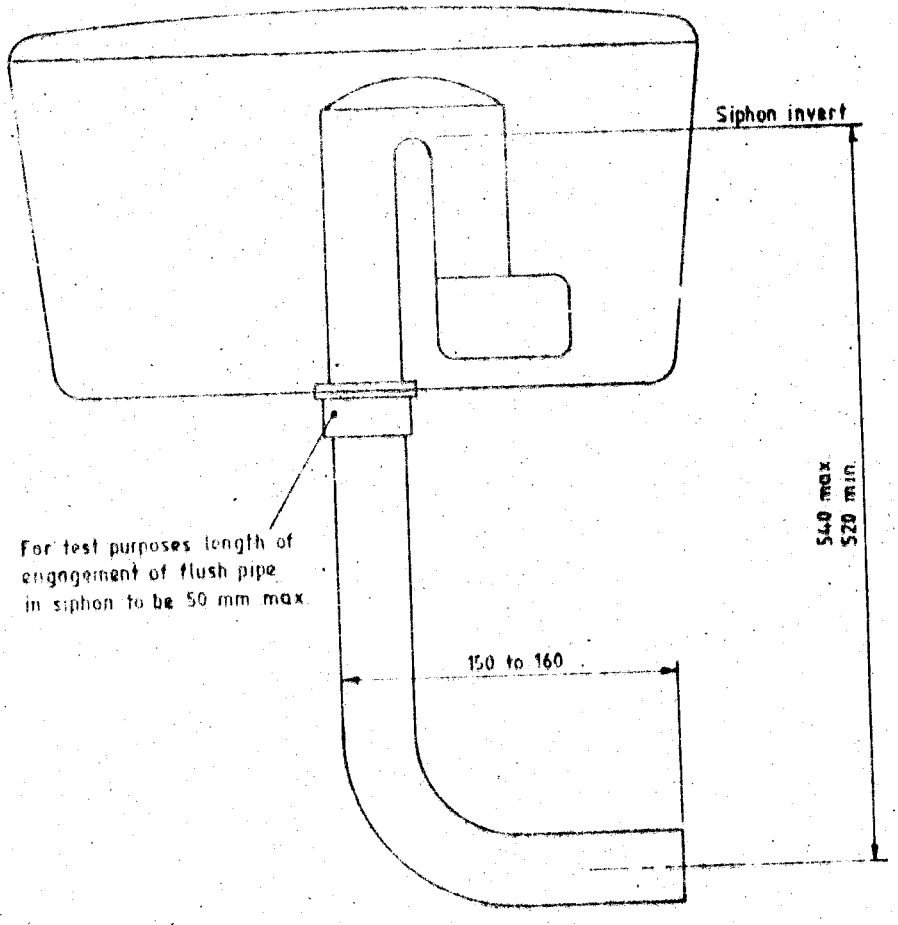


FIGURE 2 - Exploded view of the cistern



Note. Applied weight to be adjusted to give a horizontal thrust of 10 N. This can be determined initially by a spring balance at 'X'.

FIGURE 3 - Front thrust test apparatus



All dimensions are in millimetres

FIGURE 4 - Test flush pipe for low level cistern