IS : 4111 (Part 2) - 1985
(Reaffirmed 1996)

Indian Standard

CODE OF PRACTICE FOR ANCILLARY STRUCTURES IN SEWERAGE SYSTEM

PART 2 FLUSHING TANKS

(First Revision)

UDC 628.282 : 006.76

INDIAN STANDARDS INSTITUTION
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NEW DELHI 110002

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Indian Standard

CODE OF PRACTICE FOR ANCILLARY STRUCTURES IN SEWERAGE SYSTEM

PART 3 INVERTED SYPHON

(First Revision)

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Indian Standard

CODE OF PRACTICE FOR ANCILLARY STRUCTURES IN SEWERAGE SYSTEM

PART 2 FLUSHING TANKS

(*First Revision*)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 29 November 1985, after the draft finalized by the Water Supply and Sanitation Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 As far as possible sewerage system should be designed on the basis of self cleaning velocity. Stress should be laid on proper design and provision of proper gradients. However, in certain situations, it may become absolutely necessary to provide for flushing of sewers at periodical intervals to remove settled silt and sludge and flushing tanks are invariably used for such purposes.

0.3 This standard was formulated to cover ancillary structures in sewerage system. This standard first prepared in 1967 was intended to provide guidance to local bodies, public health engineering departments and others engaged in this field for the proper design and construction of flushing tanks. The important changes made in this revision are given below:

a) Guidance for the location of flushing tank have been given in detail,

b) Design consideration have been elaborated, and

c) Details of special flushing tanks have been included.

0.4 The other parts of the standard (IS : 4111) are given below:

IS : 4111 (Part 1)-1986 Code of practice for ancillary structures in sewerage system: Part 1 Manholes

IS : 4111 (Part 3)-1985 Code of practice for ancillary structures in sewerage system: Part 3 Inverted syphon (*first revision*)

IS : 4111 (Part 4)-1968 Code of practice for ancillary structures in sewerage systems: Part 4 Pumping stations and pumping mains (rising mains)

0.5 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 analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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1. SCOPE

1.1 This standard (Part 2) covers the requirements for location, design considerations and safeguards to be adopted for flushing tanks used in sewerage system.

2. TERMINOLOGY

2.0 For the purpose of this standard the following definitions shall apply.

2.1 Flushing Tank — An independent tank or chamber in which water is stored and discharged into sewer at intervals for flushing sewer.

2.2 Self Cleaning Velocity — A minimum velocity which prevents deposition of any solid matter in the sewers.

3. LOCATION

3.1 Flushing tanks shall be provided in such sections of the sewers where flow is never sufficient to generate self cleaning velocity. They may be located at heads of sewers (main or branch) or even intermediate points of the sewers.

4. DESIGN CONSIDERATIONS

4.1 General — Where it is not practicable to obtain gradient in the sewers, steep enough to give a self cleansing velocity of not less than 0·75 m/s, it requires to be flushed occasionally to pervent deposition and clogging and flushing water tanks are provided at suitable points on such sewer lines.

Under the effect of flush, a higher velocity is attained which is capable of dislodging the deposited clay, mud and other solids sticking to the side of sewer.

4.2 Quantity and Velocity of the Flush Water —For pipes under 600 mm diameter, the quantity of flushing water should be sufficient to fill

*Rules for rounding off numerical values (*revised*).

the sewer at least half-bore over the whole length of sewer to be flushed or from one flush point to the next. The head at which the flush is discharged should give an initial velocity much higher than the self-cleansing velocity, so as to ensure that solids already deposited will be removed. The approximate quantity of flushing water per flush over a length of 75 m to 90 m are as follows:

Diameter of Pipe (mm)	*Quantity of Water* (litres)
250	1 400 to 1 700
350	1 700 ,, 2 700
400	2 700 ,, 3 600
450	3 600 ,, 4 500

4.3 Methods of Flushing and Type of Flushing Devices — Among the more usual ways of flushing sewers are the following:

a) The construction of a special flushing tank at suitable points in sewer line. The special flushing tank may be either a manually operated or an automatic.

b) The controlled admission of a limited amount of surface water into sewer line at required point.

c) An extemporised flap valve or plug in a manhole at the lower end of sewer length to be flushed. This can also be achieved placing slots at the outlet side of an ordinary manhole to receive a wooden stop gate. Closing the gate will permit sewage to accumulate, and opening it will allow a rush of sewage to pass down the pipe.

d) The use of a fire hose or a water tanker for which the appropriate fire authority and water undertaking should always be consulted.

4.4 Special Flushing Tanks — Manually operated and automatic flushing tanks, are given in **4.4.1** to **4.4.2**.

4.4.1 *Manually Operated Flushing Tank* — It consists of a small independent chamber of masonry or concrete similar to a manhole of size enough to store water required for flushing the sewer once. It is connected with the manhole, in which flush is to be discharged. The diameter of connecting pipe should normally be the same as that of sewer to be flushed. It is provided with slots at the outlet side to receive a wooden stop gate to be operated manually. An overflow pipe is also provided beyond the required depth of water in this chamber, so as to avoid flooding the flushing tank if gate is not opened at appropriate time. A connection to the water supply system provides a small but constant supply of water so regulated that the tank will fill at least once daily. A manually operated flushing tank is shown in Fig. 1.

4.4.2 *Automatic Flushing Tank* — An automatic flushing tank is shown in Fig. 2. It resembles a manhole but is equipped with a syphon placed in the bottom. A connection to the water supply system provides a small but constant supply of water so regulated that the tank will fill at least once daily. When tank is full, the syphon goes into operation and quickly discharges the water down the sewer. The quantity of flush will depend upon the diameter of sewer line to be flushed (*see* **4.2**).

Adam's Syphon is one of such an automatic syphon, made of cast iron with trapped outlet for flushing. The syphon for flushing a sewer line shall be 65 mm, 80 mm or 100 mm diameter as specified.

4.4.2.1 *Fixing of Adam's Syphon* — Adam's Syphon shall be installed inside the masonry, concrete or RCC tank by using proper bolts, nuts and washers, etc, as required for the completion of the job. The joint in the tank and the syphon shall be leak proof. A typical section of a 100 mm diameter Adam's Syhpon in a 3600 litres capacity tank is shown in Fig. 2. The Syphon when installed shall be tested to see that it functions smoothly and satisfactorily.

4.5 Period of Flushing — The period of flushing should normally be once in 24 hours.

5. SAFEGUARDS

5.1 Safeguard for Automatic Flushing Tank — Whenever an automatic flushing tank is provided, there shall be a physical break between supply connection and the maximum water level in the tank.

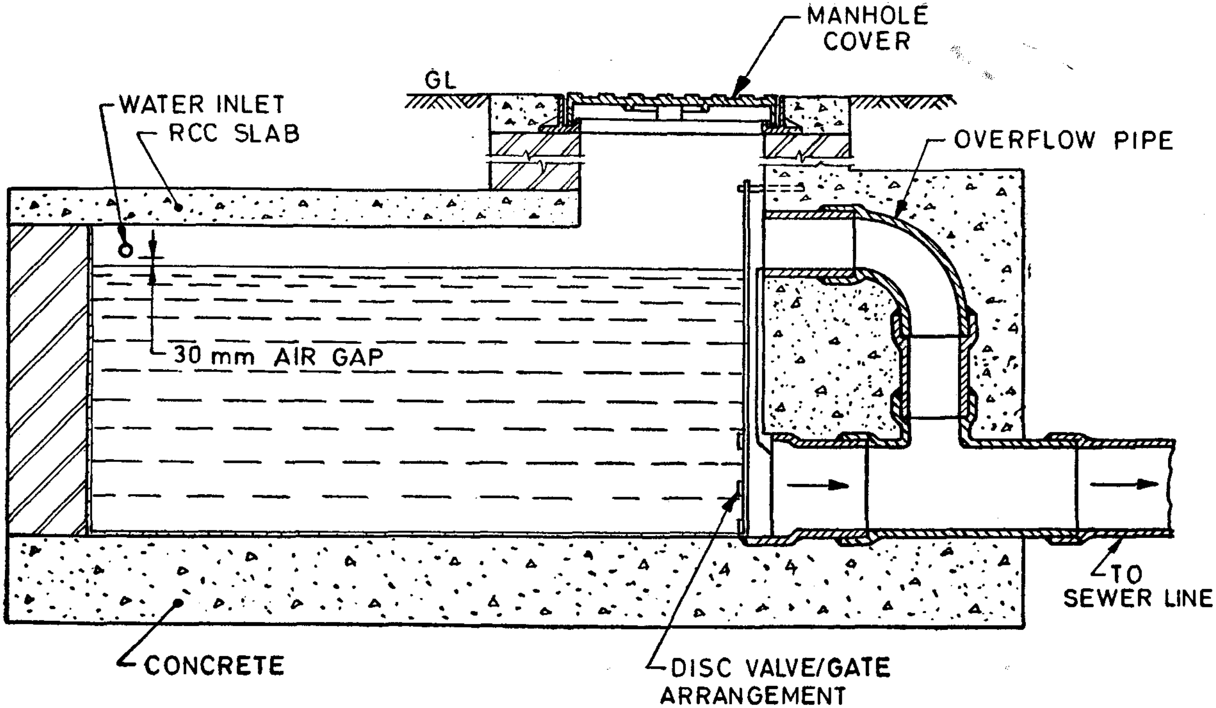
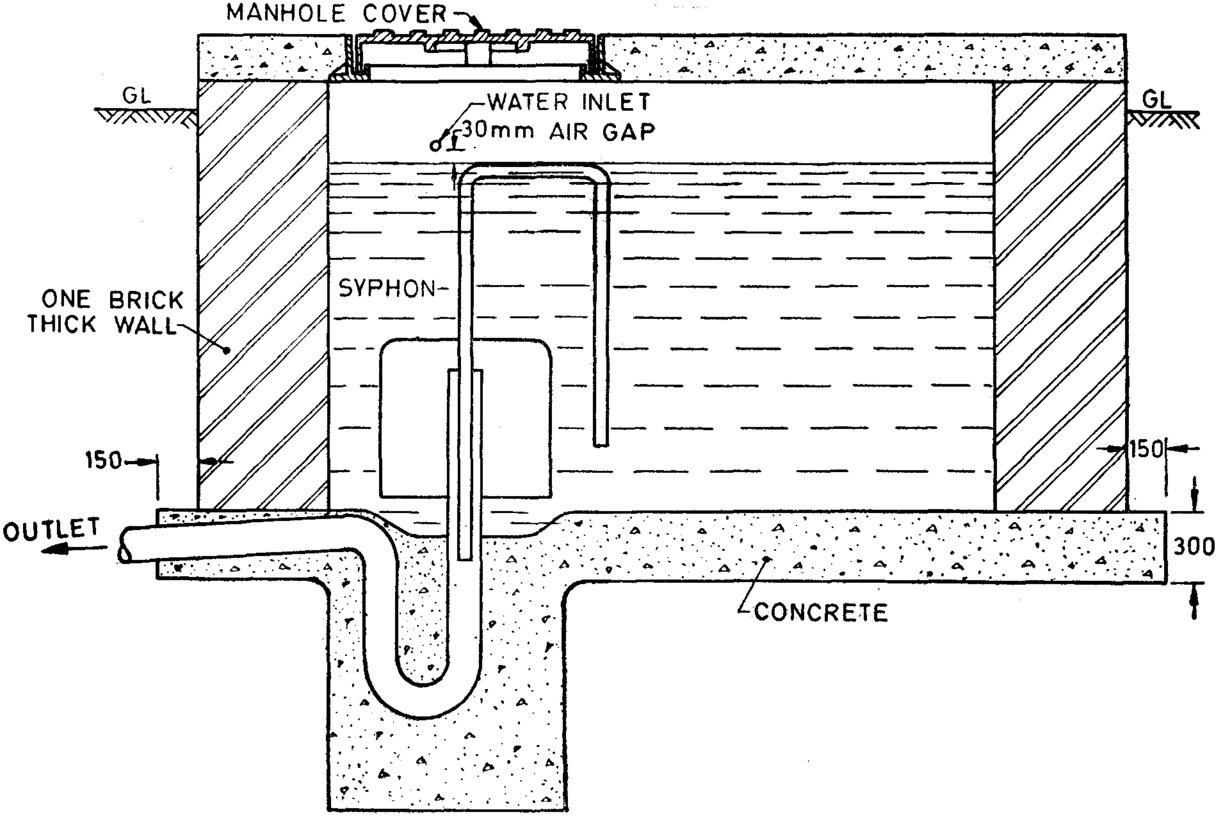


FIG. 1 TYPICAL ILLUSTRATION OF MANUALLY OPERATED FLUSHING TANK FOR SEWERS



All dimensions in millimetres.

FIG. 2 TYPICAL ILLUSTRATION OF AUTOMATIC FLUSHING TANK FOR SEWERS

(*Continued from page* 2)

Composition of Drainage Subcommittee, BDC 24 : 2

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s(s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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