

*Indian Standard*

REQUIREMENTS FOR  
CHLORINATION EQUIPMENT

PART 5 BLEACHING POWDER SOLUTION FEEDER  
DISPLACEMENT TYPE CHLORINATOR

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**BUREAU OF INDIAN STANDARDS**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

*Indian Standard*

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## PART 5 BLEACHING POWDER SOLUTION FEEDER DISPLACEMENT TYPE CHLORINATOR

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## REQUIREMENTS FOR CHLORINATION EQUIPMENT

### **PART 5 BLEACHING POWDER SOLUTION FEEDER DISPLACEMENT TYPE CHLORINATOR**

#### **0. FOREWORD**

**0.1** This Indian Standard ( Part 5 ) was adopted by the Bureau of Indian Standards on 30 April 1987, after the draft finalized by the Public Health Engineering Equipment Sectional Committee had been approved by the Civil Engineering Division Council.

**0.2** Bleaching powder solution type chlorinators are generally used in water treatment plants having capacities up to 1 MLD and in rural water supplies for disinfection of drinking water. This standard is intended to cover essential features of bleaching powder solution feeder displacement type chlorinator.

**0.3** Bleaching powder is a variable mixture of calcium hydroxide, calcium chloride and calcium hypochlorite. When mixed with water, calcium hypochlorite dissociates into calcium hydroxide and hypochlorous acid (  $\text{HOCl}$  ). Bleaching powder is made into a thin slurry with water and the supernatant which contains chlorine in solution is applied to water using a differential pressure dosing equipment.

**0.4** 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 5 ) lays down requirements for sizes, material and construction of bleaching powder solution feeder displacement type chlorinators.

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

## **2. CHLORINATOR CONSTRUCTION**

**2.1** The displacement type chlorinator consists of:

- a) A fabricated mild steel pressure vessel with a removable flanged cover, drain and outlet valves and flexible plastic or rubber bag secured tight at its neck into which the bleaching powder solution is filled and from which it is fed to the pipeline carrying water to be chlorinated. The pressure vessel is designed for a working pressure of  $0.175 \text{ N/mm}^2$  and is tested for  $0.35 \text{ N/mm}^2$ ;
- b) An orifice plate or venturi tube to produce a differential pressure in the pipeline. The differential pressure normally employed is 2 m of water head at maximum flow but can be varied, if necessary, to suit specific requirements;
- c) Withdrawal injection fitting with isolating valve for insertion in the pipeline with necessary tubing to connect it with the pressure vessel. The fittings are to withstand the pressure within the doser;
- d) A dose indicator and regulating valve attached to the pressure vessel; and
- e) A solution preparing tank with necessary valves and pipings to enable the solution to flow by gravity into the pressure vessel.

A typical sketch of the assembly is shown in Fig. 1.

## **3. MATERIALS**

**3.1** Materials to be used in different components are given in Table 1.

## **4. SIZES**

**4.1** The size of the chlorinator is defined based on the capacity of the plastic or rubber bags. The chlorinators are of the following sizes:

- a) 40 l    b) 80 l    c) 100 l    d) 150 l    e) 250 l

## **5. SELECTION OF DOSER SIZE**

**5.1** Capacity of doser is selected based on volume of bleaching powder solution required per day. Required volume of bleaching powder solution is calculated using the following formula:

$$v = \frac{0.1 Qx}{yz}$$

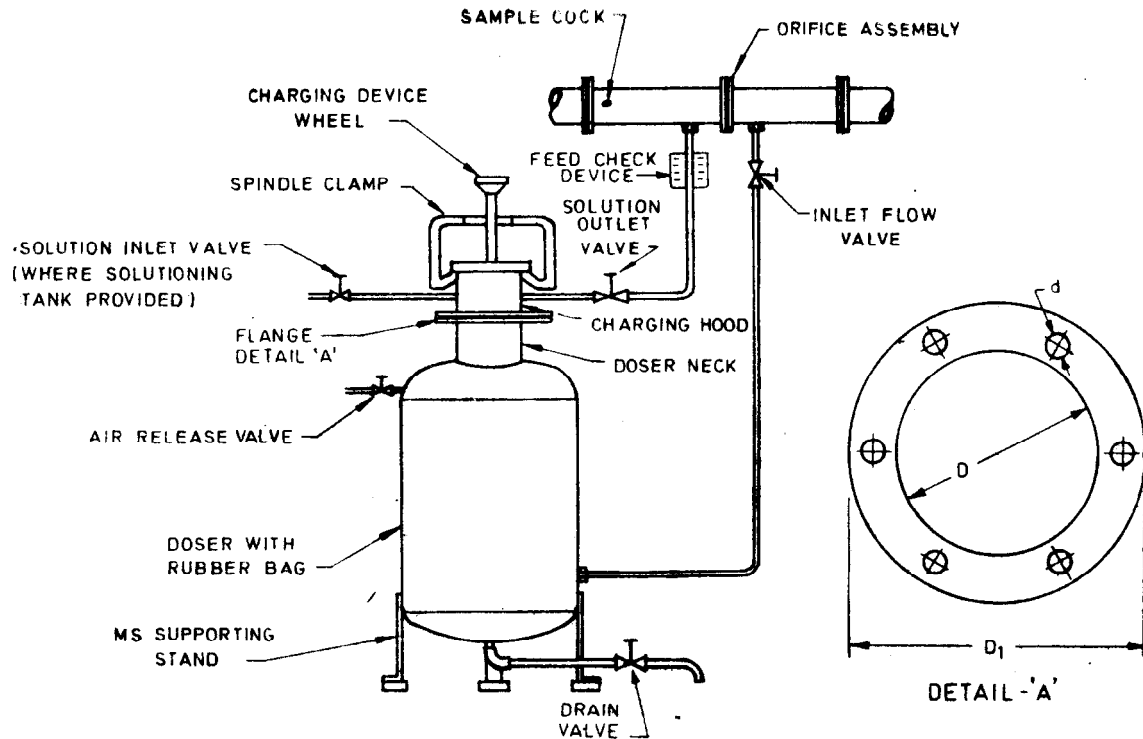


FIG. 1 TYPICAL SKETCH OF BLEACHING POWDER SOLUTION FEEDER  
DISPLACEMENT TYPE CHLORINATOR

NOTE 1 — For  $D < 150$  mm, dia of nuts and bolts,  $d$  is 12 mm, and  
For  $D \geq 150$  mm, dia of nuts and bolts,  $d$  is 16 mm.

NOTE 2 —  $D_1 = D + 2(4d)$ .

where

$v$  = volume of bleaching powder solution in litres,

$Q$  = quantity of water to be disinfected per day ( $m^3$ ),

$x$  = chlorine dose to be applied (mg/l),

$y$  = percent strength of bleaching powder solution (percent usually 3 to 5), and

$z$  = available chlorine in bleaching powder expressed as a fraction (normally 0.25 to 0.3).

**TABLE 1 MATERIALS OF DIFFERENT COMPONENTS OF BLEACHING POWDER SOLUTION FEEDER DISPLACEMENT TYPE CHLORINATOR**

( Clause 3.1 )

SL No.	COMPONENT	MATERIAL	REFERENCE TO INDIAN STANDARD
(1)	(2)	(3)	(4)
i)	Doser shell	Mild steel with lining inside with rubber, PVC or epoxy	IS : 226-1975 <sup>1</sup> IS : 4682 (Part 1)-1968 <sup>2</sup> IS : 4682 (Part 4)-1969 <sup>3</sup>
ii)	Bag	Natural or synthetic rubber/flexible plastic	—
iii)	Charging device operating wheel	Mild steel	IS : 226-1975 <sup>1</sup>
iv)	Charging hood	Mild steel with lining inside with rubber, PVC or epoxy	IS : 226-1975 <sup>1</sup> IS : 4682 (Part 1)-1968 <sup>2</sup> IS : 4682 (Part 4)-1969 <sup>3</sup>
v)	Air release valve	Plastic	IS : 9763-1981 <sup>4</sup>
vi)	Feed check device/rotameter:		
	a) Float	Polyethylene	IS : 9762-1981 <sup>5</sup>
	b) Tube	Glass/PVC	IS : 7374-1974 <sup>6</sup> IS : 3076-1984 <sup>7</sup> IS : 4984-1987 <sup>8</sup> IS : 4985-1987 <sup>9</sup>
vii)	Inlet flow operating valve	Plastic	IS : 9763-1981 <sup>4</sup>
viii)	Inlet flow regulating valve	Plastic	IS : 9763-1981 <sup>4</sup>
ix)	Drain valve	Plastic	IS : 9763-1981 <sup>4</sup>
x)	Charging device clamp	Mild steel	IS : 226-1975 <sup>1</sup>
xi)	Air release vent pipe	PVC	IS : 3076-1984 <sup>7</sup> IS : 4984-1987 <sup>8</sup> IS : 4985-1987 <sup>9</sup>
xii)	Spindle for doser	Mild steel	IS : 226-1975 <sup>1</sup>

( Continued )

**TABLE 1 MATERIALS OF DIFFERENT COMPONENTS OF BLEACHING POWDER SOLUTION FEEDER DISPLACEMENT TYPE CHLORINATOR — Contd**

Sl. No.	COMPONENT	MATERIAL	REFERENCE TO INDIAN STANDARD
(1)	(2)	(3)	(4)
xiii)	Drain pipe or bend	PVC	IS : 4984-1987 <sup>8</sup> IS : 4985-1987 <sup>9</sup> IS : 10124 (Part 8)-1982 <sup>10</sup>
xiv)	Socket for rotameter, drain, air release vent	PVC	IS : 7834 (Part 1)-1975 <sup>11</sup>
xv)	Orifice assembly (where provided)	Corrosion resistance steel	Grade 6 of IS : 3444-1978 <sup>12</sup>

<sup>1</sup>Specification for structural steel (standard quality) (*fifth revision*).

<sup>2</sup>Code of practice for lining of vessels and equipment for chemical processes: Part 1 Rubber lining.

<sup>3</sup>Code of practice for lining of vessels and equipment for chemical processes: Part 4 Plasticized PVC.

<sup>4</sup>Specification for plastic bib taps and stop valves (rising spindle) for cold water services.

<sup>5</sup>Specification for polyethylene floats for ball valves.

<sup>6</sup>Specification for glass rods and tubing.

<sup>7</sup>Specification for low density polyethylene pipes for potable water supplies (*second revision*).

<sup>8</sup>Specification for high density polyethylene pipes for potable water supplies, sewage and industrial effluents (*third revision*).

<sup>9</sup>Specification for unplasticized PVC pipes for potable water supplies (*third revision*).

<sup>10</sup>Specification for fabricated PVC fittings for potable water supplies: Part 8 Specific requirements for 90° bend.

<sup>11</sup>Specification for injection moulded PVC socket fittings with solvent cement joints for water supplies: Part 1 General requirements.

<sup>12</sup>Specification for corrosion resistant alloy steel and nickel based castings for general applications (*first revision*).



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