

# Modification of Hydraulic Filter Press for Sludge Treatment

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**ABSTRACT:** Now a day demanding waste water treatment regulatory landscape the proper handling of sludge is a very important component of the design and operation of any size of waste water treatment plant (WWTP). The ultimate mission of any such plant is to separate solids from water, and to disinfect both to different degrees by removing organic and inorganic contaminants which may be hazardous or toxic to human or have detrimental effects on the environment.

One of the advantages of the filter press is that it can accept sludge with average filterability. It is always advantages to optimally thicken sludge before filter press operation in our project is single control panel is used for all this equipment and the belt press system electric actuation. the production capacity of a filter press is between 1.5 and 10 kg of solids per m<sup>2</sup> of filtering surface.

**KEYWORDS:** sludge, waste water treatment plant(WWTP), closing of the press.

## I. INTRODUCTION

### DHARANGAGHARA CHEMICAL WORKS

DCW Limited here in called as DCW operates a chemical complex at Sahapuram, Tiruchendur Taluk, Thuthookudi District with multi location and multi products facilities. The products from this complex range are industrial. Grade Salt, Caustic Soda, Liquid Chlorine, Hydrochloric Acid, Yellow iron oxide, PVC resin.

As this process plant, it has both power and steam requirements and this is met through Coal based Co gen power plant & Captive Power plant.

DCW established their caustic soda plant in the year **1958** and the present capacity of caustic soda is **100,000 TPA** using membrane cell process. DCW established plants for the production of liquid chlorine, Trichloro ethylene, hydrochloric acid, PVC resins, captive power plant, at Sahapuram.

DCW is strategically located in an industrially backward area with a vision to make use of the available resources (like sea water) for the production of chlorine and its further effective utilization.

The proposed expansion is by enhancing the production capacity of Trichloroethylene from the existing level of **7200 TPA to 15,480 TPA**,

Polyvinyl chloride from existing level of **90,000 TPA to 150,000 TPA**, a new product of chlorinate poly vinyl chloride with **14,400 TPA**, production capacity and cogen power plant from **58.27 MW**

To **108.27 MW** (by adding 2 \* 25 MW) in the existing with industrial complex at DCW Limited, Sahapuram, Tiruchendur Taluk, Thoothukudi District, Tamil Nadu.

DCW has two manufacturing units. At Dharangadhara, Gujarat, it produces soda ash, sodium Bicarbonate & Ammonium bicarbonate. At Sahapuram, Tamil Nadu, it produces caustic soda, Liquid chlorine acid, Beneficiated ilmenite, Tri chloro ethylene, yellow Iron oxide, Ferric chloride, utox & PVC.

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The project planned with an environmentally friendly pollution abatement system that certainly prove way for sustainable improvements to the original status of the environmental components pertaining to air, water, soil, noise, socio economic factors, flora & fauna etc.

In order to assess the environment quality of the core and buffer zones, field data are collected and described with impact and mitigative measures adopted. Management plan has been presented in the report for the approval of the statutory authority.

## II. LITERATURE REVIEW

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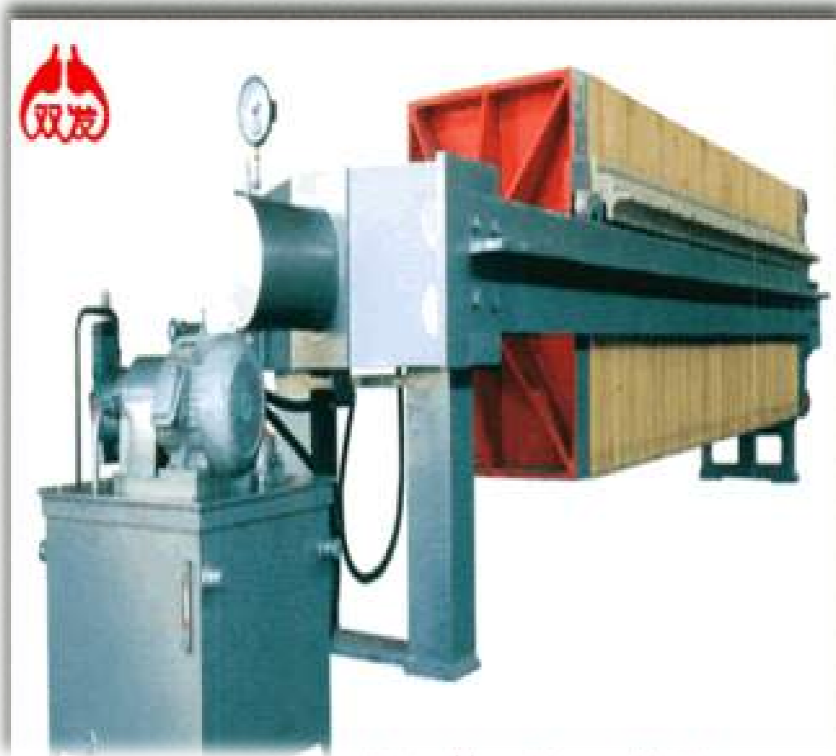
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### III. HYDRAULIC FILTER PRESS

Finally the sludge is sent in to the filter press and disposed the waste in the form of cake and this cake is used as a fertilizer or as land fill the waste.



#### PLATES

The plates consist of chamber or membrane plates made of virgin polypropylene which can be used between of thickness. The plate size of 800mm\*800mm can be used. The surface of filter plate is piped button with smooth finish.

It consists of centre feed port and four corner port and two drain port and two drain hole.

The sludge comes from the pump is sent into the centre feed port and sludge is filled in between two filter plates. The water without sludge is passed into two drain port through drain hole and finally water is recycled.

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### **FILTER CLOTHES**

The choice of filter cloth is another determining factor. It depends on the sledge to be filter (grinding, degree, concentration, presence of collides, etc) and the conditioning.

The filter clothes can be multi fibre are single fibre, with more or less water tight and made of different Materials (polypropylene, polyamide, polyester...)and joined surface lined are not.

Filter clothes manufactures have carried out a lot of improvements especially in the cake discharge during the plate shifting process.



CALCULATION

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At Clarifier

Raw water from mukani river is allowed to RO plant's clarifier in the DCW, where a sedimentation process is conducted for removing suspended solids from raw water by addition of chemical additives.

Quantity of raw water = 500 m<sup>3</sup>/hr (500,000 liters)

Quantity of raw water = 12,000 m<sup>3</sup>/day

Density of water = 1,000 kg/m<sup>3</sup>

Maximum density of sludge water can be filter in RO plant

= 1,400 kg/m<sup>3</sup>

We consider 5% suspended solids for calculation are

Quantity of raw water = 500 m<sup>3</sup>/hr

Quantity of raw water = 500,000 L

For 5% suspended solids

Mass of dry solids = 25 m<sup>3</sup>/hr

= 25/1.4

Volume occupied with 500 ml of dry solids

= 17.858 m<sup>3</sup>/hr

Quantity of sludge = 500 - (475 + 17.858)

= 7.142 m<sup>3</sup>/hr

Quantity of sludge = 8 m<sup>3</sup>/hr (8,000 L)

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AT FILTER PRESS TANK

After, sedimentation process; some quality of sludge i.e settled water in clarifier in filter press tank. Since the reliving process is handled for 15 minutes per day.

Capacity of filter

Press tank = 25 m<sup>3</sup> (25,000 L)

Quality of sludge tank = 112 m<sup>3</sup>/day (112,000 L)

At Filter press arrangement

Finally Quantity of sludge from tank is pumped and allowed to gap between each couple of plates together. Meanwhile an electro-hydraulic closing system provides required amount of load to plates.

Capacity of pump = 40 m<sup>3</sup>/hr

Plate dimensions = 0.8m\*0.8m\*0.06 in

Gap between the plates = 0.03m

Number of plates = 25

Quality of sludge taken by filter press = 32 m<sup>3</sup>/hr

Dispatching of sludge/hr = 15 min

For 24hr = 15\*24 = 300 min = 6hr

Operating time for filter press/batch = 2hr

Operating time for filter press/day = 6hr = 3 batch/day

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From above information

Quantity of sludge = 8 m<sup>3</sup>/hr

From filter testing in chemical lab shows that, for 500 ml sludge, 10kg of cake formed.

BY FILTER PRESS

Quantity of sludge pressed/hr = 80kg (i.e, 40 m<sup>3</sup>) operation

Quantity of sludge pressed/batch = 160kg cake

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Quantity of sludge pressed/day =160\*3 batch operation  
=480kg cake formed by filter press

The estimation of filter press operation implies sludge from sedimentation process in clarifier is pressed /converted in to cake(about 480kg/day) form by application of electro hydraulic mechanism

For recycling

In 480kg of cake having 11%of moisture content, so this is capture in cake, then allowed to land fill area  
Apart from that 89%of water is again pumped to the clarifier in the RO plant by recycling pumping system.

TABLE

Percentage of sludge considered (%)	Quantity of sludge pressed in filter press(m3/hr)
1	2
2	3
3	5
4	6
5	8
6	9
7	10
8	12
9	13
10	15

## IV. CONCLUSION

- The project aims at encountering the problem faced in the soil or water.
- The amount of effort required for reduced the pollution by industries

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