

Research on Cylindrical Type Centrifugal Dehydrators

Whole term

2005.4~2007.3

Text P.127~P.132

(Purpose)

While at existent decanter type centrifugal dehydrators of which Rotor consists of a cylindrical bowl and a conical bowl (hereafter called the decanter type) are widely used as centrifugal dehydrators for sewage sludge, new centrifugal dehydrators having an entirely only cylindrical bowl (hereafter called the cylindrical type) have been developed in recent years.

This research is intended to organize the characteristics, constructions, performance, etc. of the cylindrical type through experiments for comparison of performance between the decanter type and the cylindrical type, and to put together technical matters related to its design, maintenance and management, etc.

(Results)

(1) Features of the cylindrical type

Schematic diagrams of the decanter type and the cylindrical type are shown in Fig. 1. The cylindrical type covered in this research is to seek improvements in capacity against the decanter type owned by each of the member companies of the joint research, having the following features as compared with the decanter type.

- It has an entirely cylindrical bowl, and hence its bowl volume is greater than that of the decanter type, which gives a longer sludge retention time.
- Its cake discharge part has a structure consisting of gaps, which enables compaction force to be applied to the cake, thus making it possible to reduce the cake moisture content.
- The gap structure of the outlet part enables only the dewatering cakes outside the bowl having low moisture content to be discharged.

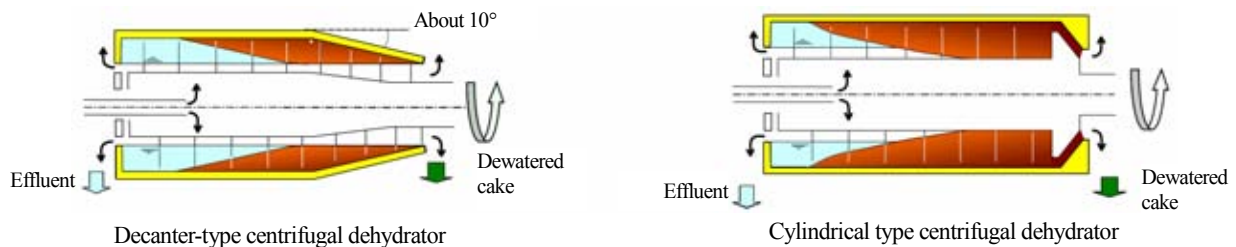


Fig. 1 Schematic diagrams of the decanter type and the cylindrical type

(2) Experimental result

An experiment for comparison has been carried out by installing testing machines of the cylindrical type and decanter type in the same treatment plant, concerning their performance for the treatment of mixed sludge, digested sludge, and OD sludge in the standard activated sludge method. An experimental result by using mixed sludge is as shown in Table-1.

Table-1 Result of the comparison investigation on treatment performance of testing machines (mixed sludge)

Item	Target of comparison with the decanter type	Result
Cake moisture content	Reduction of 3 points or more	Reduction of 7 to 8 points
Polymer dosing ratio	Around 70% of that of the decanter type	40 to 50% of that of the decanter type
Centrifugal effect	Reduction of around 1,000 G	Reduction of 1,500 G or more

(3) Standard dehydration performance

As a result of comparison investigation by using the testing machines, the standard performance of centrifugal dehydrators of the cylindrical type has been prescribed. The standard performance prescribed in regard to mixed sludge is as shown in Table-2.

Table-2 Standard performance of centrifugal dehydrators of the cylindrical type
(mixed sludge (mechanically concentrated sludge))

Type of sludge				Mixed sludge							
Sludge properties	Ignition loss (VTS)		%	86.0 to 83.0		83.0 to 80.0		80.0 to 77.0		77.0 to 75.0	
	Concentration of supplied sludge (TS)	Gravity type	%	1.0		(Separate stream type) 1.5		2.0		(Merged stream type) 2.5	
		Mechanical type	%	Around 3.5		Around 3.5		Around 3.5		Around 3.5	
	Fibrous substances (100 mesh)		%	10	20	10	20	10	20	10	20
Mechanical concentration	Dehydrated cake moisture content		%	77	76	76	74	75	73	73	71
	Amount of treatment		m ³ /h	Standard amount of treatment		Standard amount of treatment		Standard amount of treatment		Standard amount of treatment	
	Solid substance (SS) recovery ratio		%	95		95		95		95	
	Polymer dosing ratio (in relation to TS)		%	0.9		0.9		0.9		0.9	

Collaborators : Japan Institute of Wastewater Engineering Technology, Kubota Corporation,
Kotobuki Industries Co., Ltd., NGK Water Environment Systems, Ltd.,
Mitsubishi Heavy Industries Environment Engineering Co., Ltd.,
JFE Engineering Corporation, Hitachi Plant Technologies, Ltd.,
Nippon Steel Engineering Co., Ltd., Kobelco Eco-Solutions Co., Ltd.
Researchers : Masayuki Matsuura, Toru Meguro, Kunio Tamura, Nobuaki Chuganji

Key words

Decanter type centrifugal dehydrator, cylindrical type centrifugal dehydrator, reduction in cake moisture content, reduction in polymer dosing ratio, reduction in centrifugal effect