

Study on Cylindrical Type Centrifugal Dehydrators

Whole term

2005.4 ~ 2007.3

(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.

(Details of research)

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 cake 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 achieve the reduction in cake moisture content.
- * The gap structure of the outlet part enables the dewatering cakes outside the bowl having low moisture content to be put together before discharging them.

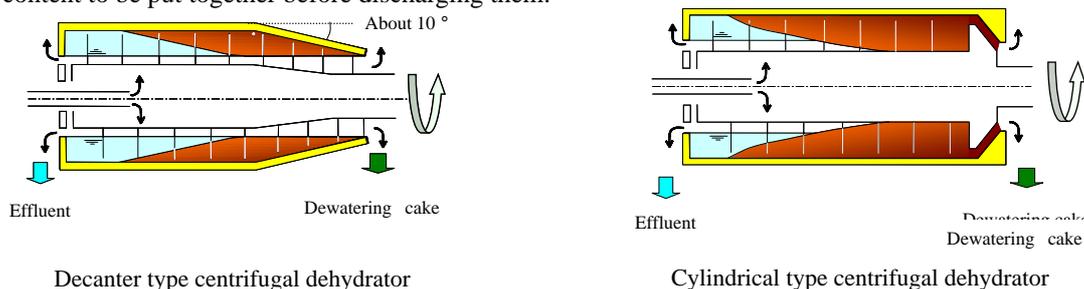


Fig.-1 Schematic diagrams of the decanter type and the cylindrical type

(1) Research items

- [1] Organizing of operational data of the cylindrical type which were installed in each wastewater treatment plant.
- [2] Investigation and comparison of performance by using small testing machines of the decanter type and the cylindrical type (0.5 m³/h) (carried out 3 kind of sludge (mixed raw, digested, and Oxidation Ditch) in both seasons of summer and winter.
- [3] Investigation of the operational situation of the installed cylindrical type machines in four seasons

(2) Results of research until the present

As a result of investigation and comparison of performance by using both small testing machines, a list of the effects of reduction in cake moisture content, etc. of the cylindrical type versus the decanter type in summer season is shown in Table-1. It has become clear that the cylindrical type can satisfy the specified target values as opposed to the decanter type. Also, in the investigation of the operational situations of the installed cylindrical type in spring through autumn, it has been verified that cake moisture content of about the same level can be obtained under the same operational conditions (polymer dosing ratio; centrifugal effect) as those employed for the testing machines.

Table-1 Effects of reduction in moisture content, etc. of the cylindrical type versus the decanter type in summer season

Item verified		[1] Cake moisture content (%)	[2] Polymer dosing ratio (%)	[3] Centrifugal effect (G)
Mixed sludge	Target ^{*1)}	Reduction of 3 points or more	Reduction of around 30%	Reduction of around 1,000 G
	Result	Reduction of 7 points	Reduction of around 50%	Reduction of around 1,500 G
Digested sludge	Target ^{*1)}	Reduction of 2 points or more	Reduction of around 20%	Reduction of around 1,000 G
	Result	Reduction of 4 points	Reduction of around 70%	Reduction of around 1,000 G
OD sludge	Target ^{*1)}	Reduction of 2 points or more	Reduction of around 20%	Reduction of around 1,000 G
	Result	Reduction of 3 points	Reduction of around 50%	Reduction of around 1,000 G ^{*2)}

*1)The target value shows the value for the cylindrical type as compared with the decanter type.

*2)In the verification of energy saving effect when treating OD sludge, there was a reduction of around 500 G in the high moisture content area.

(Study schedule)

Investigation and comparison of performance in winter season by using small testing machines as well as investigation of the operational situations of the installed cylindrical type shall be carried out, and at the same time questionnaire investigation of performance, etc. with local self-governing bodies having cylindrical type machines shall be carried out. Also, technical manuals shall be prepared by putting together the results of research such as performance of cylindrical type as obtained from the test result and matters to be noted in maintenance and operation as obtained from the result of the questionnaire investigation.

Collaborators : Japan Institute of Wastewater Engineering Technology, Kubota Corp., Kotobuki Industries Co., Ltd., NGK Insulators, Ltd., Mitsubishi Heavy Industries, Ltd., JFE Engineering Corp., Hitachi Plant Technologies, Ltd., Nippon Steel Corp., Kobelco Eco-Solutions Co., Ltd.

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key words

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