

## Study on High-rate Pressure-type Screw Press Dehydrator

Whole term

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### (Purpose)

The pressure-type screw press dehydrator was jointly studied by Japan Institute of Wastewater Engineering Technology and six companies in 1999 and 2000. The results were compiled in the form of a technical manual, so that the features of the plant were widely recognized, culminating in the fact that more than 100 units of this kind have so far been implemented in Japan. However, there has been high demand for even higher dehydration performance. A particularly important challenge has been to increase the dehydration performance for hard-to-dehydrate digested sludge and other sludge. This high-rate pressure-type screw press dehydrator is result of dehydration improvement by increasing the thickening efficiency in the thickening zone, which is the first stage of dehydration, based on a review of the dehydration mechanism in order to increase the dehydration performance.

This study aims to systematize the knowledge about dehydration experiments (using conventional and high rate demonstrative test plants) and operation status surveys (based on a real plant), and compile the technical matters on the design specifications and maintenance in the form of a technical manual.

### (Result)

#### ( 1 ) Dehydration performance

For evaluation of the dehydration performance of the high-rate pressure-type screw press dehydrator, two cases were set, one with priority to the throughput and the other with priority to the moisture content of cake in comparison with the conventional model. Table 1 shows a comparison of dehydration performance for various types of sludge between the high-rate model and the conventional model.

The operation with priority to the throughput is intended to increase the throughput though the moisture content of cake is the same as that of the conventional model. The throughput of the raw mixed sludge thickened mechanically increased by 70% and the throughput of other sludge increased by 30% compared with the conventional model.

Then, the operation with priority to the moisture content of cake is intended to reduce the moisture content of cake though the throughput is the same as that of the conventional model. The moisture content of cake of the excess sludge thickened by the OD process was reduced 1 point and the moisture content of the other sludge was reduced 2 points compared with the conventional model. Regarding the chemical dose and the SS recovery rate, there is no difference between the high-rate model and the conventional model.

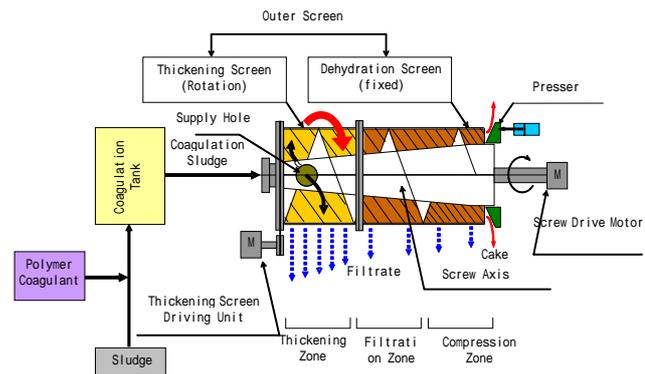


Fig.1 Details of High-rate Model

Table 1 Comparison of Dehydration Performance between the High-rate Model and the Conventional Model

Operation type		Operation with priority to the throughput				Operation with priority to the moisture content of cake			
Dehydration performance item		Throughput	Moisture content of cake	Chemical doze	SS recovery rate	Throughput	Moisture content of cake	Chemical doze	SS recovery rate
Raw mixed sludge	Gravity thickening	30% UP	Same as the conventional model	2 points lower	Same as the conventional model	Same as the conventional model			
	Mechanical thickening	70% UP					2 points lower		
Anaerobic digested sludge	Gravity thickening	30% UP					2 points lower		
	Mechanical thickening	30% UP					2 points lower		
Excess sludge thickened by the OD process		30% UP					1 point lower		

Note 1: The throughput in the operation with priority to the throughput shows the increase compared with the conventional model that is operated on the priority to the moisture content of cake.

Note 2: The moisture content of cake in the operation with priority to the moisture content of cake shows the reduction rate compared with the conventional model that is operated on the priority to the moisture content of cake.

(2) Effects of the plant

In treatment plants of three scales, small-scale (1,000m<sup>3</sup>/day), medium-scale (10,000 m<sup>3</sup>/day), and large-scale (200,000 m<sup>3</sup>/day), the authors performed trial calculations on the high-rate type belt press dehydrator and high-rate centrifugal dehydrator being the conventional sludge dehydrator, conventional pressure-type screw press dehydrator, and high-rate pressure-type screw press dehydrator. The trial calculation demonstrated that:(1) the high-rate pressure-type screw press dehydrator of the operation with priority to the throughput effectively reduces the initial cost and running cost, the energy, and the installation space; and (2) it of the operation with priority to the moisture content of cake effectively reduces the disposal expenses of cake.

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key words

High-rate, Dehydration, Screw press