

Study on the utilization of the condensing and drying technology of sewage sludge

Whole term

1994. 12 ~ 1998.3

(Purpose)

Large energy from the melting facility in a sewage sludge treatment process has been used for heating and drying the air injected initially, however most of them has not been used. Because of that, the reduction of the maintenance expense has become necessary by using none-used energy effectively. In Osaka Prefecture, heat energy in the melting system has been recovered as steam to be used for drying the dewatered cake. However, 40 percent of recovered steam has not been used in that system.

Therefore, the development of a technology on the effective use of the none-used energy has been necessary. This technology is as the following process. A mixture of primary and excess sludge is dewatered in a direct centrifugal condensing dewatering facility without gravity condensing. Then the sludge is dried in a centrifugal thin film drier and sent to a melting system. In this technology, as the generated steam in the melting facility is used in the drying process, the none-used energy can be used effectively.

This study on the utilization was carried out from 1994 to 1998, as a practically applied model project of the innovative technology, by a joint study of Osaka Prefecture and the Japan Institute of Wastewater Engineering Technology, then the design method, the method of the operational management, the performance of the facility, the effective use of the energy, and the evaluation of the cost were examined. The establishment of a method of utilization was the objective.

(Result)

A real scale facility (sludge melting facility of 80 ton/day) was constructed at Central Treatment Plant in Aigwa in Osaka Prefecture in 1996. The performance of each equipment was examined and the durability of the centrifugal thin film dry facility against the abrasion was also tested. The facts mentioned below became clear as a result of the above examination.

1. Test on the durability of the centrifugal thin film dry facility against the abrasion

The abrasion in the upper part which had high percentage of water content and the down part, from which dried sludge was exfoliated, gradually decreased. Therefore, the amount of abrasion was affected by the behavior of the dried sludge.

2. Test on the performance of the dewatering system with the centrifugal condensation.

(1) Analysis of the characteristics of the supplied sludge resulted in higher content of TS as 3.26-4.78% than that in small facilities.

(2) Even though there was no difference in the treatment performance according to the depth of the dam, 4P was determined as the optimal condition.

(3) The water content in the cake and the recovery rate of SS did not change with the variation of the supplied sludge quantity, and a good quality was obtained at over 1,500-2,000G of centrifugal force.

(4) Even though the centrifugal force was changed from 1,500 to 2,000G, the water content in the cake and the recovery rate of SS were stable.

(5) A small difference in the velocity made the water content in the cake low.

(6) As the percentage of the input chemical content was low, the water content in the cake tended to be high and the recovery rate of SS tended to be low.

(7) The torque setting should be changed frequently to control the constant operation of the torque. Therefore, the constant control operation in different velocities is suitable for a long continuous operation.

3. Test on the performance of the centrifugal thin film dry facility

(1) At a low flow rate around 200 L/h, over drying tended to be small, and the same result as

with the sludge mixture last year, were obtained in this year.

(2) If the rotation-number of the blade was high, the percentage of water content in the dried cake would reduce.

(3) The distributor which made the supply of dewatering cake uniform performed well.

(4) As dewatering cake was supplied, it became stable after 30 minutes and performed well.

(5) The result of the steam magnification, that was 1.2-1.5, was the same as that of last year.

(6) The electric energy consumed by the motor was 30-35 kw in such a case that the percentage of water content was 40-45%.

(7) As per the result of the continuous operation for 24 hours with the operational conditions of 350 L/h supply at 450 rpm, the stable drying treatment was possible.

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Keywords

Thin film dry, Condensing and dewatering, Effective use of thermal energy