

The area-wide treatment project of sewage sludge in Hyogo prefecture
A Study of efficient sludge drying

Whole term

1992.10 ~ 1994.3

(Purpose)

The Hyogo West ACE Center accepts pretreated sludge of wastewater from local industry as well as general sewage sludge, and performs the drying and melting treatments. The sludge from pretreatment plants contains high percentage of highly adhesive colloid. Therefore, the center has applied complicated operations such as using drying machines as a bypass before melting. However, such an operation is considered to be difficult to continue in the future, as the volume of the sludge has been increasing in recent years. Therefore, it is necessary to install a new system for the efficient drying treatment of colloid sludge in addition to the existing drying system. Hence, drying experiments were conducted in this study with the centrifugal membrane drying machines using the sludge from the pretreatment plants, which are predicted to increase. And the optimal drying system was investigated.

(Results)

1) Pilot experiment using the most adhesive colloid sludge

The moisture content of the concentrated sludge was changed from 72.5% to 80%, and according to the moisture content, concentrated sludge was supplied with the loading range from 200kg/h to 500kg/h to evaluate the drying capacity. However, at the beginning, the moisture content of the dried sludge was not stable and ranged from 40% to 55%. Also, a phenomenon that sludge peeled off from the middle point of the heating surface was observed.

Therefore, preventive measures against the peeling off of the sludge from the middle point of the heating surface in order to stabilize the drying capacity were discussed, and a part of the drying machine was remodeled. As a result, the moisture content during the operation was stable, and with the loading of the concentrated sludge supply at 300kg/h (the moisture content of the concentrated sludge was 77.5%), the moisture content of the dried sludge decreased from 45-50% (before remodeling) to approximately 25%.

2) Pilot experiment using mixture of general and colloid sludge

The moisture content of the concentrated colloid sludge was changed from 77.5% to 80%, and according to the moisture content the concentrated sludge was supplied with the loading range from 200kg/h to 700kg/h to evaluate the drying capacity. The moisture content of dried sludge did not change much according to the loading variation of concentrated sludge supply. When the moisture content of the concentrated sludge was less than 77.5%, the moisture content of the dried sludge was approximately less than 45%.

3) Experiment using general sewage sludge

The moisture content of the concentrated general sludge was changed from 82.5% to 85%, and according to the moisture content the concentrated sludge was supplied with the loading range from 200kg/h to 500kg/h to evaluate the drying capacity. When the loading of the concentrated sludge was 400kg/h (the moisture content of the concentrated sludge was 85%), the moisture content of the dried sludge ranged from 40 to 45%.

4) Steam ratio (steam consumption amount/evaporated moisture amount)

The steam ratio was almost constant (1.1 ~ 1.2), regardless of the variation of evaporated moisture amount.

5) Power consumption of the drive motor in the drying machine

Power consumption of the drive motor in the drying machine was almost constant (15kW), regardless of the different moisture content of the concentrated sludge or the sludge loading.

6) Start-up feature of the drying machine

Start-up of the drying machine was quick and the machine was stabilized within about 40 minutes.

7) Characteristics of wastewater and exhaust gas in the drying operation

NH₄-N concentrations of condensed water in the drying machine were 1/3rd ~ 1/20th of the conventional drying machines (disc type). Odor intensity index value of the dried exhaust gas (in the dried exhaust gas scrubber outlet) was low and 2.3 on an average.

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Keywords

colloid sludge, centrifugal membrane drying