

OPTIMIZATION OF SLUDGE DEWATERING AT THE SCREW DEHYDRATOR BY INSTALLING A PNEUMATIC DAM PLATE

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The study presents the results of research on the effectiveness of installing a pneumatic dam plate (Fig. 1) on a screw sludge dehydrator at a municipal wastewater treatment facility. The aim of the experiments was to extend the service life of the screw by avoiding peak loads and stabilizing dewatering parameters.

During the research, monitoring was carried out on the torque on the screw shaft, cake moisture, and other operational parameters under varying pressures of the pneumatic press system. It was found that the operation of the pneumatic pressure system maintains a stable torque in the range of 34,5 – 36,5 %, which allows the dryness of the sludge to remain within acceptable limits, even when the properties of the input sludge fluctuate. It was confirmed that increasing the torque beyond 42 % does not lead to a significant rise in dryness, making operation in this mode inefficient.

Advantages of the pneumatic system include prevention of overloads, simplified startup after idle periods, reduced time to reach steady-state operation, improved maintenance of the discharge zone, and adaptation to changing sludge properties without operator intervention.

It was found that due to the automatic action of the dam plate, the system independently responds to changing conditions: when the filtration capacity of the sludge decreases, the plate presses tighter, compensating for the torque drop; when it improves, the plate opens to prevent outlet blockage. This approach reduces the frequency of emergency situations and ensures the stability of output parameters without significant operator involvement.

The results demonstrate the feasibility of implementing an automated torque control system with the ability to adjust screw rotation speed and flocculant dosage in real time. A comparative analysis of the pneumatic dam plate with the traditional (stationary) dam plate is planned.



Figure 1 – Installation of a pneumatic dam plate and its control system