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DESIGNING AND TESTING A SEPTIC TANK FOR A SINGLE HOUSEHOLD

Ala Kirjanova*, Mindaugas Rimeika, Regimantas Dauknys

Vilnius Gediminas Technical University, Department of Water Management, 11 Sauletekio, Vilnius, LT-10223, Lithuania

Abstract

A septic tank is an essential part of the decentralized wastewater management system. The aim of the experiment described in this paper was to evaluate the impact of the method of sampling and hydraulic retention time (HRT) on the performance of a circular three chamber septic tank and to design a septic tank for a single household with four residents and wastewater flowrate of 0.6 m³/d. It was found out that the difference between suspended solids (SS) and chemical oxygen demand (COD) removal efficiency values obtained by whether simultaneous sampling or sampling considering HRT was minor. Increasing HRT from 1–1.5 to 3.5 days resulted in increased SS (from 48±33% to 65±20%) and COD (from 38±21% to 49±13%) removal efficiencies. During the experiment total phosphorus (P-total) and Kjeldahl nitrogen (TKN) were not removed in the septic tank. However, the removal of organic nitrogen and phosphorus as well as the conversion of these substances to ammonium and orthophosphate ions took place. According to these results, a circular three chamber septic tank for a single household of four residents with HRT of 3.5 days was designed and tested for 191 days at wastewater temperature of 10.6–17.0 °C. Average SS removal efficiency of the septic tank reached 79±18%, while COD – 51±13%.

Key words: domestic wastewater, hydraulic retention time, nutrients, organic matter, septic tank, suspended solids

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* Author to whom all correspondence should be addressed: E-mail: ala.kirjanova@vgtu.lt, Phone: +370 60159608