INTISARI

Kebutuhan air bersih selama pandemi meningkat sangat tinggi akibat meningkatnya kesadaran masyarakat untuk menerapkan perilaku hidup bersih dan sehat (PHBS), sehingga diperlukan pengolahan air yang lebih. Pada umumnya metode pengolahan air dilakukan secara konvensional seperti sistem koagulasi – flokulasi, saringan pasir cepat, dan desinfeksi. Namun terjadi penurunan kapasitas dan kemampuan filter pasir akibat stratifikasi partikel filter setelah proses cucibalik. Biaya cucibalik yang relatif mahal karena kebutuhan pergantian partikel filter. Filter beton adalah salah satu inovasi dalam pengolahan air. Penelitian sebelumnya mengenai filter beton meninjau arah aliran filtrasi ke bawah, akan tetapi tidak ada analisis arah aliran horizontal. Oleh karena itu dilakukan analisis efektivitas kinerja filtrasi dan cucibalik pada teknologi filter beton dengan arah aliran horizontal.

Percobaan uji filtrasi dilakukan menggunakan air simulasi pada kekeruhan 125 NTU berdasarkan pada kekeruhan sampel air selokan Mataram dengan variasi kecepatan filtrasi 0,2; 0,5; 1,0; 5,0; dan 10,0 m/jam, sedangkan uji cucibalik dilakukan pada kecepatan 40,91 m/jam dengan 3 menit waktu cucibalik. Variabel yang diukur selama proses filtrasi adalah kehilangan tinggi tekanan, dan nilai kekeruhan pada inlet dan outlet filter beton.

Hasil dari percobaan diperoleh bahwa kapasitas performa filter beton selama proses filtrasi berbanding lurus dengan kecepatan filtrasi, sedangkan efektivitas filter beton berbanding terbalik dengan kecepatan. Proses cucibalik selama 3 menit pada kekeruhan awal ≤ 617 NTU memperoleh kekeruhan akhir yang lebih rendah daripada air baku yang digunakan sebesar 5,19 NTU. Sedangkan pada kekeruhan > 617 NTU, hasil kekeruhan akhir masih tinggi sekitar 14,6 – 26,4 NTU.

Kata kunci: Aliran Horizontal, Filter, Filtrasi, Kecepatan Aliran, Kekeruhan

ABSTRACT

The need for clean water during the pandemic has increased due to increased public awareness of adopting a clean and healthy lifestyle (PHBS), so further advanced water treatment is needed. Generally, conventional methods for water treatment are used, such as coagulation-flocculation systems, rapid sand filters, and disinfection. However, the capacity and the sand filter ability decreased due to the stratification of filter particles after the backwashing process. The backwashing costs became relatively expensive because it needed sand replacement. Concrete sand filter is one of the innovations in water treatment. Previous research on concrete sand filters reviewed downflow filtration, but there's no further analysis of horizontal flow. Therefore, a performance analysis of concrete sand filters' filtration and backwashing effectiveness with the horizontal flow is needed.

The filtration experiment using simulated water at turbidity of 125 NTU based on the Mataram channel turbidity with a filtration rate variation of 0.2; 0.5; 1.0; 5.0; and 10.0 m/hour, and the backwash at a flow rate of 40.91 m/hour for 3 minutes. The variables measured during the filtration process are the head losses and turbidity at the concrete sand filter's inlet and outlet.

The results show that the capacity performance during the filtration process is directly proportional to the flow rate. In contrast, the effectiveness of the concrete filter is inversely proportional to the flow rate. The 3 minutes backwash process at initial turbidity ≤ 617 NTU obtained final turbidity that was lower than the raw water used, which was 5.19 NTU. Meanwhile, at turbidity > 617 NTU, the final turbidity was still high, around 14.6 – 26.4 NTU.

Keywords: Filter, Filtration, Flow Rates, Horizontal Flow, Turbidity