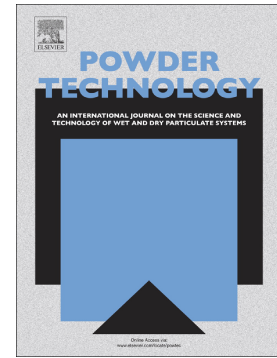


Accepted Manuscript

Experimental study and optimization on filtration and fluid flow performance of a granular bed filter

Y.S. Yu, Y.B. Tao, Z. Ma, Ya-Ling He



PII: S0032-5910(18)30291-2
DOI: doi:[10.1016/j.powtec.2018.04.019](https://doi.org/10.1016/j.powtec.2018.04.019)
Reference: PTEC 13320
To appear in: *Powder Technology*
Received date: 25 September 2017
Revised date: 16 March 2018
Accepted date: 12 April 2018

Please cite this article as: Y.S. Yu, Y.B. Tao, Z. Ma, Ya-Ling He , Experimental study and optimization on filtration and fluid flow performance of a granular bed filter. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. *Powder Technology*(2018), doi:[10.1016/j.powtec.2018.04.019](https://doi.org/10.1016/j.powtec.2018.04.019)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Experimental Study and Optimization on Filtration and Fluid Flow Performance of a Granular Bed Filter

Y.S. Yu, Y.B. Tao^{*}, Z. Ma, Ya-Ling He

(Key Laboratory of Thermo-fluid Science and Engineering, Ministry of Education, school of Energy and Power Engineering, Xi'an Jiaotong University, Xi'an, Shaanxi 710049, China)

Abstract: An experimental system for a fixed granular bed filter (GBF) used to filter dust particles in the industrial flue gas was built. The effects of filtration superficial velocity, bed height, and granules size on filtration and fluid flow performance were investigated. The results demonstrate that the GBF has high filtration efficiency and relatively low pressure drop, e.g. the filtration efficiency can reach 99.45% with a pressure drop of 291 Pa. The increase of filtration superficial velocity leads to the decrease of filtration efficiency but the increase of pressure drop. The filtration superficial velocity lower than 0.6 m/s is recommended to achieve higher filtration efficiency, lower pressure drop and acceptable filtration rate in the studied geometric parameter range (granule size: 3-10 mm, bed height: 30-120 mm). The increase of bed height and the decrease of granules size are beneficial to increase filtration efficiency, but detrimental to reduce the pressure drop. In addition, the effects of granules size on pressure drop are more significant than that on filtration efficiency. Based on the experimental results, the structural optimization was performed for the fixed GBF and an optimized structure with different granules sizes was designed. The validation results indicate that the designed GBF structure has excellent filtration and fluid flow performance compared with the traditional structure with single granules size. Under the investigated filtration superficial velocity region, the average filtration efficiency is enhanced 3.23% and the pressure drop is reduced 49.94%.

Keywords: Granular bed filter; filtration efficiency; pressure drop; structural optimization

Corresponding author. Tel.: +86 29 82665445; fax: +86 29 82665445.
E-mail address: yubingtao@mail.xjtu.edu.cn (Y.B. Tao)

Download English Version:

<https://daneshyari.com/en/article/6674771>

Download Persian Version:

<https://daneshyari.com/article/6674771>

[Daneshyari.com](https://daneshyari.com)