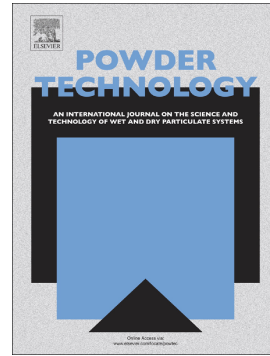


## Accepted Manuscript

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PII: S0032-5910(18)30304-8  
DOI: doi:[10.1016/j.powtec.2018.04.032](https://doi.org/10.1016/j.powtec.2018.04.032)  
Reference: PTEC 13333  
To appear in: *Powder Technology*  
Received date: 9 August 2017  
Revised date: 1 February 2018  
Accepted date: 14 April 2018

Please cite this article as: Selda Yiğit Huncce, Elif Soyer, Ömer Akgiray , On the backwash expansion of graded filter media. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Ptec(2017), doi:[10.1016/j.powtec.2018.04.032](https://doi.org/10.1016/j.powtec.2018.04.032)

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## On the Backwash Expansion of Graded Filter Media

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### Abstract

Granular media filtration is one of the most important and commonly used operations in water treatment and is also widely used for advanced wastewater treatment. Successful filter design requires a correct specification of backwash rates for filter cleaning. Significant progress has been made in recent years towards a capability of accurate predictions of backwash expansion of uniform (sieved) fractions of nonporous and porous nonspherical media. Graded filter media, however, have not been studied in a systematic and satisfactory way so far. Current design calculations consider a bed with a size gradation to consist of several layers of approximately uniform size according to the sieve analysis data, and the expansion of each layer is separately calculated. The total expansion is calculated by adding the expansions of all the layers. The present work evaluates the accuracy of this approach and a number of alternative calculation methods by carrying out fluidization experiments with actual filter media including silica sand, garnet sand, perlite, crushed recycled glass, activated carbon, anthracite coal, and zeolite.

### Keywords

Filter backwash; fluidization; serial model; sieve analysis; sphericity.

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