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Jun Deng, Zhenping Wan, Rui Cao

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Jun Deng, Zhenping Wan*, Rui Cao

School of Mechanical and Automotive Engineering, South China University of Technology,

Guangzhou 510640, China

*Corresponding author. E-mail address: zhpwan@scut.edu.cn

Abstract: A novel catalyst support for volatile organic compound elimination—stainless steel fiber sintered felt with honeycombed channels (SSFSFHC)—is prepared via solid phase vacuum sintering. The SSFSFHC is composed of a three-dimensional reticulated skeleton, irregular open pores and interconnected parallel channels. The surfaces of the stainless steel fibers are rough and characterized by laminar and jagged structures. The influence of the honeycombed channels on the pressure drop across the SSFSFHC is experimentally analyzed. Experimental results indicate that the pressure drop mainly depends on the channel occupied area ratio. This kind of rough stainless steel fiber sintered felt (SSFSF) exhibits a higher inertial coefficient and high permeability compared with smooth SSFSF and foam materials. The correlations of the pressure drop for SSFSFHCs are established, and a structural factor is proposed to characterize their geometric features. In addition, a surface morphology strengthened factor is suggested for the characterization of the influence of the rough surface morphologies of the fibers on the inertial coefficient. Finally, a statistical analysis of the correlations is conducted to prove the significance of the correlations.

Key words: Stainless steel fiber sintered felt, Honeycombed channel, Rough surface morphology, Pressure drop, Inertial coefficient