

절곡길이가와 절곡각도가 절곡필터 성능에 미치는 영향

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The Influence of Pleated Length and Angle on the Pleated Filter

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1. Introduction

One of the most important parameters governing performance and quality of a filter is pressure drop, which strongly depends on the properties of the actual filter media. In case the filter is pleated, also the shape of the pleat strongly influences the pressure drop. Andreas Wiegmann, Stefan Rief and Dirk Kehrwald[1.4] also did some simulation works using their own software . such as PleatDict, GeoDict, FilterDict, SuFiS, and ParPac.

2. Simulation

In the following simulation we set the mass flow rate as $1\text{Kg/m}^2\cdot\text{s}$. The average air flow rate is about 20.4cm/s . Then we changed the walls and pores diameter from 0.1mm to 0.001mm . And then we changed pleated length and width respectively when all the other factors been set.

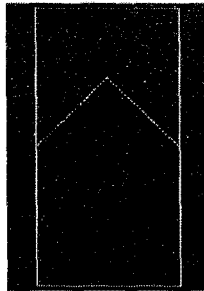


Figure 1 The simulation model used (purple line: mass inflow, red line: outflow, yellow lines: symmetry, white lines: the media)

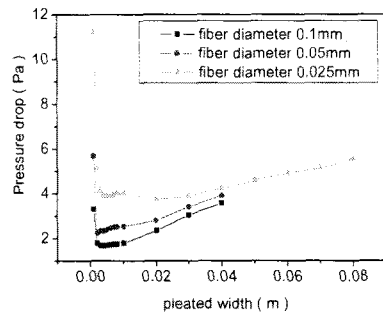


Figure 2 The influence of fiber diameter on the pleated width

3. Results and discussion

3.1 The influence of fiber diameter on the pleated width

Figure 2 shows the effect of pleated width on pressure drop according to the diameter change. We can see that when the fiber diameter decrease filtration pressure drop will increase, and the lowest pressure drop point will shift to high value of pleated width.

3.2 The influence of fiber diameter on the pleated length

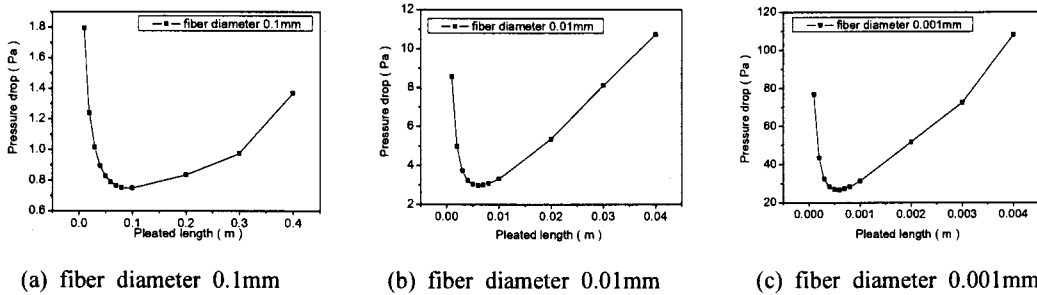


Figure 3 The influence of fiber diameter on the pleated length

Figure 3 shows results that when we kept the pleated width as 0.1mm, 0.01mm and 0.001mm and then change the pleated length and fiber diameters respectively. We can see that when the fiber diameter decreased filtration pressure drop will increase, and the lowest pressure drop point will change according to the permeability of the filter.

3.3 The influence of pleated angle on the pressure drop

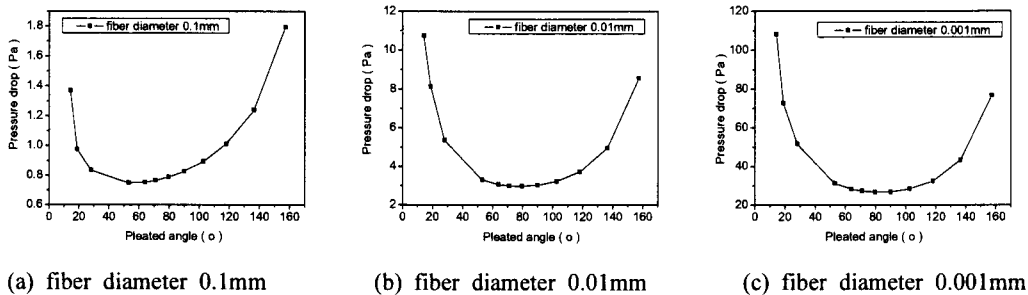


Figure 4 The influence of pleated angle on the pressure drop

Figure 4 shows the pleated angle which got from the calculation of figure 2 and figure 3 data. We found that pleated length divided by pleated width should be in the range of 0.4-1. That is mean pleated angel should be in the range of 60°-80°. But this range will change as the permeability of the filter been changed. When the permeability decrease, the pleated angle will shift to low value, while the permeability increase, the pleated angle will shift to high value. The further work is under going.

4. Conclusion

We found that pleated length divided by pleated width shouldbe in the range of 0.4-1. That is mean pleated angel should be in the range of 60°-80° . But this range will change as the permeability of the filter been changed. When the permeability decrease, the pleated angle will shift to low value, while the permeability increase, the pleated angle will shift to high value.

References

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