Abstract

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Influence of the inlet cross-sectional shape on the performance of a multi-inlet gas cyclone

The influence of inlet cross-sectional shape on the flow pattern, pressure, and cut-off diameter of a gas cyclone was studied using the CFD model. Accordingly, five different inlet cross-sectional shapes, namely, circle, ellipse, rectangle, square, and trapezoid, for the double-inlet gas cyclone were studied. It was observed that the maximum tangential velocity was about 1.95 times the corresponding inlet velocity for primary and secondary rectangle inlets. Furthermore, the computed tangential velocity in the cyclone with the primary and secondary rectangle inlets (R-R) was considerably greater than those obtained by the other inlet shapes. In this case, the axial gas velocity reached its highest values at the bottom of the vortex finder and the cyclone center. It was also determined that the inlet shape significantly affected the cyclone pressure. The Circle-Square and the Rectangle-Ellipse configurations of inlet cross-sectional shape generated, respectively, the lowest pressure and the highest efficiency.