

Relation between Velocity and Pressure in circular and NonCircular Shape Duct for Local Exhaust Ventilation (LEV) System

ABSTRACT

Local exhaust ventilation (LEV) is used to isolate contaminants from the source. It is vital to ensure good air quality, particularly for employees exposed to hazardous gases such as high-temperature factories and kitchens where food is cooked. This simulation explores how a particular cross-sectional duct structure influences the ventilation device's velocity distribution and pressure decrease. The system's design consists of a collecting hood, 90° bends, 45° bends, and a straight pipe. Three models use the same volume around the unit. There are circular (Model A), square (Model B), and rectangular (Model C). This study is carried out using Computational Fluid Dynamic (CFD). The simulation shows the behaviour of the airflow from the inlet to the exit in all three models. Model A is the most preferable of the results produced because the velocity distribution in this circular line is evener and more balanced. The average velocity of the model A device is a mean of 2.80m/s, and the lowest mild pressure is -76.74 Pa. Changes in the path of the system's flow creates eddy and disturbance to the system's flow. Higher pressure to sustain the optimal flow speed will increase energy consumption and help more robust preliminary designs for local exhaust ventilation.