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**Title:** The flow pattern and entropy generation in an axial inlet cyclone with reflux cone and gaps in the vortex finder

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**Abstract:** This paper aimed at studying the contribution of the reflux cone and the gaps in the vortex finder to the reduction of energy consumption in the cyclones. The flow field was calculated using Reynolds Stress Model (RSM). Based on the numerical investigations, the entropy generation analysis method was used to explain the mechanism of energy consumption inside cyclone separators. The regional entropy generation in four parts viz. the outlet pipe, the inlet part, the region around vortex finder and the region below vortex finder was calculated and analyzed to identify the zones where the energy is largely consumed. The results show that the reflux cone and the gaps help reduce the entropy generation in the gas-outlet pipe, in the regions around and under the vortex finder, whereas increase the entropy generation in the inlet part. In addition, the reflux cone restrains the reflux flow and mainly reduces the entropy generation in the region around the vortex finder. The gaps reduce the flow rate under the vortex finder and mainly reduce the entropy generation in that region.

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