

Effects of Inlet Velocity and Solid Loading on Collection Efficiency of Cyclone

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It is well known that collection efficiency of particles in cyclone separators is strongly influenced by solids loading in the inlet gas stream. Since loading effect is significant on the collection efficiency, the effects of the solid loadings and inlet gas velocity on the collection efficiency should be determined for cyclone design purpose. The solid used in this study was iron ore fines with a mean diameter of 6.5 μm and a density of 3720 kg/m³. All the experiments were performed under ambient conditions at the inlet velocity range of 14–25 m/s over solid loadings in the range of 10–150 g/m³ in a Stairmand high-efficiency cyclone with the 0.16 m i.d.. In the range of solid concentrations, pressure drop in the cyclone with the solid laden air flow is about 40% of that for clean air. The overall collection efficiency and grade efficiency increase with increasing solid loading and the inlet gas velocity. The effect on grade efficiency is qualitatively consistent with the mechanism that any material in excess of critical load is dumped to cyclone wall, essentially without being classified, while the remainder continues to the separation space proper, where it is separated roughly as if the cyclone were operating at low loading.