

Evaluation of local exhaust ventilation system performance for control of Fe₂O₃ dust at an iron making unit

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Abstract

Introduction: Adherence to the design values and ventilation standards (VS) after installing and also maintaining continuous work of ventilation system with maximum performance throughout its life are amongst the reasons of ventilation systems monitoring. Therefore, the aim of this study was to evaluate performance of local exhaust ventilation system for control of dust by measuring the operating parameters and also to compare it with ventilation standards (VS) and design values.

Material and Method: The present research is a descriptive and cross-sectional study, conducted in three sections of measuring, monitoring and evaluating the operating parameters on hoods, channels and fan of ventilation system based on the current status of the system, documentation (design), and recommended standards (VS). Static pressure, velocity pressure, surface area, and flow rate were measured based on the recommendations of various sources and ACGIH industrial ventilation manual, and the data were compared with the design and recommended values, using the SPSS software version 16.

Result: The results of paired sample t-test between flow rate and velocities of design and current status, showed significant differences in various parts. Accordingly, the results revealed a reduction of more than 50% in the design duct velocity compared to the current duct velocity, while design duct velocity is 1.3 more than the standard duct velocity of current status, and current duct velocity is about 65% of standard duct velocity.

Conclusion: The reduction and nonconformity of the results of measurements of operating parameters (after a minimum of two decades) with design and standard values are corroborant and sufficient reason for obstructions, abrasions, leaks, imbalance of system ducts and their inefficiency in some branches. Since there is no base line measurements for system (supposing that the system worked with maximum amounts of setup time), one of the reasons for these changes can be attributed to lack of schedule for regular and appropriate maintenance.

Key words: *Dust, Local Exhaust Ventilation System, Operating Parameters, Ventilation Standards*

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