

An evaluation of filtration and air cleaning equipment performance in existing installations with regard to acceptable IAQ attainment

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A number of trends are stimulating interest in the usage of filtration and air cleaning as an adjunct to the environmental conditioning of buildings. These include escalation of energy costs, heightened awareness about acceptable IAQ, aging of the commercial building inventory, numerous revisions and addenda to ventilation standards and building codes, and green building/sustainability initiatives and energy tax credits.

A field study was performed on established installations of particulate and gas-phase filtration in and around Atlanta, Georgia (USA) and included a variety of building types and usage and evaluated environmental conditions and air-borne contaminants. The study was undertaken in two parts with Phase I being to establish and finalize test and measurement protocols and a Phase II field investigation.

This paper provides a summary of both Phases, including characteristics of untreated outdoor air, and air cleaning with particulate filters and gas-phase air filtration. Overall, there was a TVOC reduction of 38-74%, 0.5 μm particulate removal efficiency of 28-95%, and an ozone removal efficiency of 100%. Each building had annual operational cost savings ranging between US\$10,000 and US\$800,000. The field study is intended to establish the parameters of dilution air compared with similar characteristics of air treated with particulate and gas-phase filtration. The field study demonstrated that filtered air can meet or exceed the IAQ level from simple dilution with outdoor air. The study also documents the comparable energy savings as a result of a reduction in outdoor air ventilation rates and significant control of specific contaminants of concern regarding occupant safety and building security.

Keywords: air cleaning, contamination control, energy conservation, indoor air quality gas-phase air filtration