Derivations of Equations Necessary for Primary Airflow Redistribution in VAV Systems to Reduce Outdoor Air Intake While Meeting Ventilation Requirements

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ABSTRACT

The multiple spaces equation of ASHRAE Standard 62-1989 makes it possible to bring in a smaller fraction of outdoor air than that dictated by the critical space. This paper develops an analytical proof that increasing the primary airflow rate to the critical space reduces the outdoor airflow rate required to meet ventilation requirements. For systems employing fan-powered boxes, where more than one box is critical, a systematic procedure for incrementally increasing the primary air is currently required. Also presented are equations necessary to undertake such a systematic procedure of incrementally increasing the primary air for situations typically encountered in the operation of fan-powered variable-air-volume systems.

* The full text of this paper can be found in the International Journal of Heating, Ventilating, Air-Conditioning and Refrigerating Research, Volume 3, Number 1, January 1997, pp. 3-18.