

## Impact of Ventilation Systems on Indoor Air Quality in Swedish Primary School Classrooms

**Authors :** Sarka Langer, Despoina Teli, Blanka Cabovska, Jan-Olof Dalenbäck, Lars Ekberg, Gabriel Bekö, Pawel Wargocki, Natalia Giraldo Vasquez

**Abstract :** The aim of the study was to investigate the impact of various ventilation systems on indoor climate, air pollution, chemistry, and perception. Measurements of thermal environment and indoor air quality were performed in 45 primary school classrooms in Gothenburg, Sweden. The classrooms were grouped into three categories according to their ventilation system: category A) natural or exhaust ventilation or automated window opening; category B) balanced mechanical ventilation systems with constant air volume (CAV); and category C) balanced mechanical ventilation systems with variable air volume (VAV). A questionnaire survey about indoor air quality, perception of temperature, odour, noise and light, and sensation of well-being, alertness focus, etc., was distributed among the 10-12 years old children attending the classrooms. The results (medians) showed statistically significant differences between ventilation category A and categories B and C, but not between categories B and C in air change rates, median concentrations of carbon dioxide, individual volatile organic compounds formaldehyde and isoprene, in-door-to-outdoor ozone ratios and products of ozonolysis of squalene, a constituent of human skin oils, 6-methyl-5-hepten-2-one and decanal. Median ozone concentration, ozone loss -a difference between outdoor and indoor ozone concentrations- were different only between categories A and C. Median concentration of total VOCs and a perception index based on survey responses on perceptions and sensations indoors were not significantly different. In conclusion, ventilation systems have an impact on air change rates, indoor air quality, and chemistry, but the Swedish primary school children's perception did not differ with the ventilation systems of the classrooms.

**Keywords :** indoor air pollutants, indoor climate, indoor chemistry, air change rate, perception

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