

Carbon dioxide:

Elevated levels of carbon dioxide (above 1000 PPM) may result in complaints of general discomfort, headaches and fatigue.

Health symptoms such as fatigue, headaches, difficulty in concentrating, eye and upper respiratory irritation, and an increased incidence of respiratory infections often occur in indoor environments when the amount of outside air delivered by the ventilation system is not sufficient for the number of people occupying the space.

When outside air exchange rates are insufficient, a buildup of air contaminants such as particulates and volatile organic compounds is possible. The sources of these contaminants can be human respiration, building materials, furnishings, cleaning products, pesticides, fuel-fired equipment, tobacco smoke, outdoor pollution and construction and renovation activities.

ASHRAE has issued the most comprehensive set of recommendations for indoor air quality in the document 62-1989, "Ventilation for Indoor Air Quality". ASHRAE recommends that the ventilation system provide 15 cfm (cubic feet per minute) of outside air per person in classrooms.

Outside air must be supplied to rooms and offices with no windows at a rate that complies with the Building Laws of the City of New Includes Amendments to December 1, 1991). The section of this code entitled Ventilation for School Structures specifies "that classrooms and administrative rooms, where the index is below 1650, shall have a supply of outdoor air of 15 cfm per occupant and mechanical exhaust. When outdoor air is supplied by mechanical means, the exhaust shall be at least 80 percent of the supply." (The interior rooms at PS 7Q meet this definition of the Building Code and thus require 15 cfm (cubic feet per minute) of outside air and mechanical exhaust that is at least 80 percent of the supply). When the windows in perimeter rooms are closed, the mechanical ventilation system should also provide 15 cfm of outside air.

A good indicator of inadequate ventilation in a school or office building is the level of carbon dioxide. Carbon dioxide is a gas present in the outside air at levels of around 300 to 400 parts of carbon dioxide per million parts of air (ppm). Since people exhale carbon dioxide, indoor air levels of carbon dioxide increase when the ventilation does not supply adequate outside air. *ASHRAE has recommended that a level of 1000 ppm carbon dioxide be used to indicate a supply of 15 cfm of outside air per person.* According to ASHRAE guidelines, carbon dioxide levels in excess of 1000 ppm indicate an inadequate supply of outside air when there are at least 7 persons per 1000 square feet. (In cases where there are less than seven persons per 1000 square feet, there might not be enough carbon dioxide generated to make this gas an appropriate predictor of the adequacy of the ventilation).

If outside air exchange rates are not adequate, carbon dioxide levels may increase as the day progresses or when the occupancy increases. The Environmental Protection Agency (EPA) and the National Institute for Occupational Safety and Health (NIOSH) have stated in guidance documents that the most important factors related to indoor air quality are ventilation rates, the quantity of outside air provided to the space, and the total occupancy.