INTERPRETATION IC 62-2001-07 OF
ANSI/ASHRAE STANDARD 62-2001
VENTILATION FOR ACCEPTABLE INDOOR AIR QUALITY

Transfer Approved: January 12, 2002

Originally issued as interpretation of Standard 62-1989 (IC 62-1989-29) on April 29, 1995, but revised (IC 62-1999-5) on March 14, 2000 based on approval of Addendum 62f and publication of Standard 62-1999. Revisions made to Background, Question and Answer statements to reflect Standard 62-1999 language. Subsequently transferred to Standard 62-2001. Since no changes were made to the relevant sections of Standard 62-2001, no revisions were made to the interpretation as part of this transfer.

Request from: H.E. Burroughs, IAQ/Building Wellness Consultancy
225 Mt. Ranier Way Alpharetta, GA 30022-5438

References. This request originally referred to Section 6.2 of Standard 62-1989; the revision applies to the same section of Standard 62-2001.

Background. A high school in Pasco County, Florida was renovated to correct air quality; thermal; humidity; pressurization; and equipment operating, control, and capacity deficiencies. The corrective renovation was performed as a performance contract, which balanced the corrective design tactics with energy optimization constraints.

Concurrently, the county school board administration required the renovation to conform to Standard 62-1989. The design was based upon the IAQ method of Standard 62 and included the following features:

- Ventilation rates @ 10 cfm per student design occupancy
- Positive pressurization control
- Rigorous humidity control
- Controlled at less than 60% RH 24 hours per day
- Dedicated outdoor air pre-treatment
- Continuous RH monitoring
- Continuous system operation based on humidity sensing
- Upgrade and replacement of all air handlers
- Ducted return air system
- Individual classroom temperature control
- High efficiency mini pleat particulate filtration (95% ASHRAE Atmospheric Dust Spot) pre-filtered with 2" pleats
- High capacity gas phase air cleaners (deep pleated active particle type)
- CO_2 monitoring
- New supply air diffusers to optimize ventilation effectiveness

The facility was extensively evaluated prior to renovation to establish baseline IAQ data and to determine areas and contaminants of concern. The facility was re-evaluated subsequent to construction to verify air quality levels and compliance to Standard 62. The environmental quality factors evaluated included temperature, relative humidity, carbon monoxide, carbon dioxide, nitrogen dioxide, volatile organic compounds, respirable particulates, pressurization, and sound. The values on the iterated factors documented compliance and attainment of a high level of indoor air quality. In this evaluation, carbon dioxide was monitored over an extended period to assure the response and behavior patterns of the HVAC system-not as a quality assurance target.

The origin of this interpretation request emerges from a concern on the part of the owner that regulatory representatives use 700 ppm of CO_2 above outdoors (originally 1000 ppm indoors) as a measure of ventilation where corrective action is recommended. These recommendations are interpreted by staff and parents to be requirements with which the school district must comply. To not comply triggers negative repercussions with the staff and parents and invites additional visits by the regulatory agency representatives resulting in possible mandates or penalties.

Original Question. When the IAQ Procedure of Section 6.2 is employed and gas phase air cleaners are installed to control bioeffluents and odors, is the 1000 ppm CO_2 guideline value in Table 3 still applicable?

Question revised to reflect 1999 version of the standard: When the IAQ Procedure of Section 6.2 is employed and gas phase air cleaners are installed to control bioeffluents and odors, is a 700 ppm CO_2 concentration above outdoors, discussed in Appendix D as an indicator of human bioeffluents, applicable?

Answer. No.

Comment. While the 700 ppm guideline may still be useful, it is not strictly relevant to situations where air cleaning is employed to control odors from human bioeffluents. The 700 ppm guideline in Appendix D is based on the use of indoor carbon dioxide concentration as an indicator of human bioeffluent concentrations and on the need to control the level of bioeffluents in order to provide indoor air quality that is acceptable in terms of olfactory perception (odor). Furthermore, indoor carbon dioxide concentrations in the range of 700 ppm above outdoors are not related to any health impact from the carbon dioxide itself, only to odor perception. 700 ppm above outdoors is the steady-state carbon dioxide concentration differential corresponding to a constant ventilation rate of 15 cfm/person of outdoor air in a space occupied by sedentary adults. Chamber studies have shown that 15 cfm/person and indoor carbon dioxide concentrations that are about 700 ppm above outdoors correspond to 80% satisfaction of visitors to such a space with respect to body odor. If the bioeffluents that result in perceptions of human body odor are controlled by means other than dilution ventilation, for example, by gas phase air cleaning, then the indoor carbon dioxide concentration is no longer a useful indicator of perception of these objectionable bioeffluents. Therefore, if the IAQ Procedure is employed and gas phase air cleaning is used to control bioeffluents, then the 700 ppm carbon dioxide guideline is not strictly applicable.

However, when using the IAQ Procedure, one must still consider the concentrations of all relevant pollutants and the ability of the design approach to control these pollutants. Even when gas phase air cleaning is used, ventilation may still be a significant means of pollutant control. Since indoor carbon dioxide concentrations can be a useful indicator of outdoor air ventilation rates per person, carbon dioxide concentrations may still be meaningful in relation to overall ventilation rates and the concentrations of other pollutants. However, no generalizable relationship exists between indoor carbon dioxide concentrations and the concentrations of other pollutants, as it does between carbon dioxide and human bioeffluents.