INTERPRETATION IC 62-2001-40 OF
ASHRAE STANDARD 62-2001
VENTILATION FOR ACCEPTABLE INDOOR AIR QUALITY

Transfer Approved: January 12, 2002

Originally issued as interpretation of Standard 62-1999 (IC 62-1999-39) on September 5, 2001, but 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.

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Reference: This request for interpretation refers to the Ventilation Rate Procedure presented in ANSI/ASHRAE Standard 62-2001, particularly Section 6.1.3, Ventilation Requirements, Section 6.1.3.1, Multiple Spaces, and Section 6.1.3.4, Intermittent or Variable Occupancy.

Background 1: A school has 75 classrooms, each designed for 30 students, an auditorium designed for 500 students, and a cafeteria designed for 700 students. The school has an enrollment of 2000 students plus 80 faculty. One system serves the entire school.

Interpretation 1a: In Equation 6-1, the sum of the outdoor airflow rates for all branches on the system V_{on} would be based on the total occupancy of the school, that is, it would equal 2080 people x 15 cfm/person = 31,200 cfm.

Question 1a: Is Interpretation 1a correct?

Answer 1a: No. In Equation 6-1, V_{on} is the sum of the ventilation airflow required for each simultaneously occupied space or zone. It needs to be based on the occupancies and Table 2 requirements for the various spaces/zones, e.g. office areas - 20 cfm/person, classrooms - 15 cfm/person, hallways - 0.10 cfm/ft^2, and locker rooms - 0.50 cfm/ft^2.

Interpretation 1b: In Equation 6-1, V_{on} would be based on the occupancy levels in each individual room, that is, it would equal (75 x 30 + 500 + 700 + 80) x 15 cfm/person = 52, 950 cfm.

Question 1b: Is Interpretation 1b correct?

Answer 1b: No. As stated above, V_{on} is based on simultaneously occupied spaces or zones, not the sum of the peak occupancies in each space. If all occupants were in classrooms, then V_{on} = 2080 * 15 = 31,500 cfm. However, some occupants are in office areas, while some may be in the auditorium or cafeteria.

Comments on 1a and1b: The standard does not provide explicit guidance on how to deal with issues of "population diversity," that is, where the sum of the design occupancies for each space served by a system is greater than the total expected occupancy of the building. Section 6.1.3.4 allows for systems to adjust outdoor air quantities to spaces based on variations in occupancy, but does not describe these adjustments in detail. Based on the total occupancy of 2080 people, the value of V_{on} would indeed be based on that value, but these people must be "distributed" among the various spaces served by the system and the individual ventilation requirements for each space type must be used. Also, note that before multiplying the number of people in a space by the ventilation requirement for that space, the designer must account for ventilation effectiveness per Section 6.1.3.3. This could lead to the value of cfm/person being increased. Finally, Table 2 does not contain a ventilation requirement for cafeterias in educational facilities, only for cafeterias in commercial facilities.

Background 2: A gymnasium space is regularly used for gym class and recreational sports, with occupancy of less than 50 persons. This same space is also used very infrequently for homecoming dances and indoor graduation ceremonies, with 2000 people for less than 3 hours in duration. A system is configured with dampers for two different ventilation rates depending upon occupancy.

Interpretation 2a: The gym-class occupancy ventilation rate would be 50 people x 20 cfm/person = 1000 cfm (Reference 6.1.3, 2nd paragraph, page 10)

Question 2a: Is Interpretation 2a correct?

Answer 2a: Yes. (See comments below.)

Interpretation 2b: The gym-class occupancy ventilation rate would be 1/2 x 2000 people x 15 cfm/person = 15,000 cfm

Question 2b: Is Interpretation 2b correct?

Answer 2b: No, the gym-class occupancy ventilation rate should be based on the occupancy during those classes, not on the occupancy during dances and graduation ceremonies..

Interpretation 2c: The event-occupancy (dances and ceremonies) ventilation rate would be 2000 people x 15 cfm/person = 30,000 cfm (Reference Table 2)

Question 2c: Is Interpretation 2c correct?

Answer 2c: No, not if the event is less than three hours.

Interpretation 2d: The event ventilation rate would be 1/2 x 2000 people x 15 cfm/person = 15,000 cfm (Reference 6.1.3.4)

Question 2d: Is Interpretation 2d correct?

Answer 2d: Yes, but only if the ventilation requirement for the given event is 15 cfm/person. In addition, in accordance with Section 6.1.3.4, the duration of peak event-occupancy must be less than three hours and the average event-population must be less than one-half of the peak event-population, i.e., less than 1000 person.

Comments on 2a, 2b, 2c and 2d:
These questions relate to three separate issues. The first relates to the space being used for two distinct types of events with very different occupancies. The second issue relates to the ventilation requirements for different space uses. And the third related to peak occupancies of less than three hours in duration as discussed in Section 6.1.3.4.

With respect to the first issue, the phrasing of the interpretations specifically refers to “gym occupancy” and “event occupancy.” This distinction implies that the two different uses are being considered separately, and indeed they would have different ventilation requirements. The system would need to be able to provide these different outdoor air ventilation rates based on the space usage. But if the system was not capable of such control and had only one possible outdoor air ventilation rate, it would need to be the larger.

While the interpretation is worded in terms of 15 cfm/person for all of the uses of the gymnasium, that might not be the appropriate ventilation requirement under all circumstances. For dances, it might be more appropriate to use a value of 25 cfm/person for Ballrooms and Discos in Table 2.1.

With respect to the peak occupancy issue during dances and other such events, since they are less than three hours in duration, Section 6.1.3.4 allows the design occupancy to be reduced to the average occupancy, but not less than one-half the peak value. The requester is directed to previous interpretations (specifically numbers 14, 18, 20, 23, 25, 27 and 32) for more information on intermittent occupancy.

Again, as noted in the comment for interpretations 1a and 1b, the designer must account for ventilation effectiveness per Section 6.1.3.3. This could conceivably lead to the per person ventilation requirement for the space being increased above 15 cfm/person or whatever rate is appropriate.