Interpretation IC 170-2008-10 of
ANSI/ASHRAE Standard 170-2008
Ventilation of Health Care Facilities

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Request from: Travis English (Travis.R.English@kp.org), Kaiser Permanente, 1800 Harrision Street, Oakland, CA 94612.

Reference: This request for interpretation refers to the requirements in ANSI/ASHRAE/ASHE Standard 170-2008, Section 7and Table 7-1, regarding to ER Waiting and Radiology waiting rooms.

Background: Healthcare buildings account for roughly 4.5% of commercial building footprint in the US [1]. And, for healthcare buildings, designers calculate outdoor air (OA) ventilation using the air change per hour (ACH) rates in ASHRAE Standard 170 (S170) Table 7.1.

In the remaining commercial buildings, engineers calculate outdoor air ventilation rates using the ventilation rate procedure (VRP) of ASHRAE Standard 62.1 (S62.1). The VRP requires a per person component, a per square foot component, and a consideration of ventilation distribution effectiveness.

The following is a comparison of ER waiting room cases, using both methodologies. For the S62.1 comparison, the waiting room is calculated as a "reception area", in a commercial office environment.

1. Case 1: A 300 square foot, low-density waiting room is designed with fixed seating for 10 people (30 square foot per person). The ceiling is 13 ft high, to create a feeling of space for the occupants.
2. Case 2: A 300 square foot, low-density waiting room is designed with fixed seating for 10 people (30 square foot per person). The ceiling is 7 ft 6 in high, based on structural constraints.
3. Case 3: A 300 square foot, high-density waiting room is designed with fixed seating for 20 people (30 square foot per person). The ceiling is 13 ft high, to create a feeling of space for the occupants.
4. Case 4: A 300 square foot, high-density waiting room is designed with fixed seating for 20 people (30 square foot per person). The ceiling is 7 ft 6 in high, based on structural constraints.

Calculations for each are shown in **Table 1** below

Table 1 – Calculation of outside air flow rates

Case	#People	Sq.Ft.	Ceiling ht. (ft)	ACH Reqd	OA (S170)	Rp	Ra	Ez	OA (S62)
Case 1	10	300	13	2	130	5	0.06	0.9	75.6
Case 2	10	300	7.5	2	75	5	0.06	0.9	75.6

Case 3	20	300	13	2	130	5	0.06	0.9	131.1
Case 4	20	300	7.5	2	75	5	0.06	0.9	131.1

Resultant outside air flows, in ACH, are shown in **Figure 1** below. Air change per hour is constant using S170. ACH rate increases from case 1 to case 4 using S62.1.

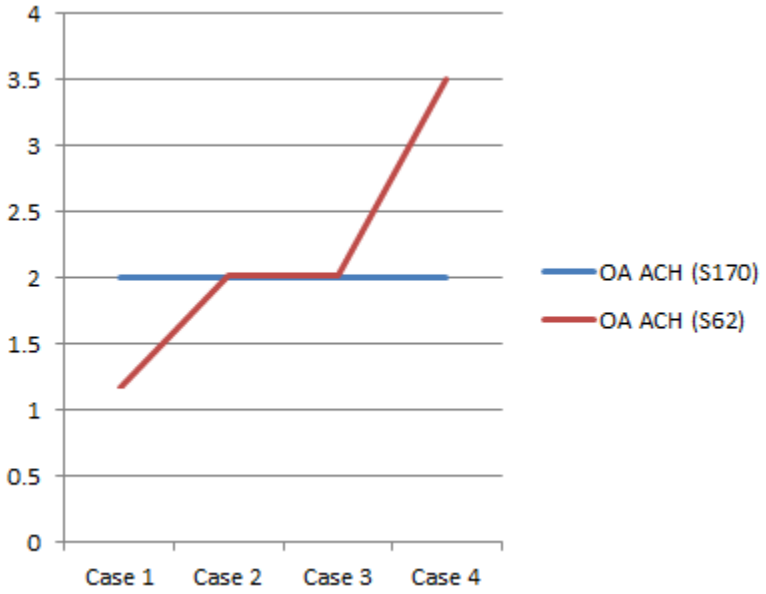

Figure 1 – Outside air ACH of all cases, using both standards.

Resultant outside air flows, in cfm per person, are shown in **Figure 2** below. Cfm per person is fairly constant using S62.1. It decreases from case 1 to case 4 using 170.

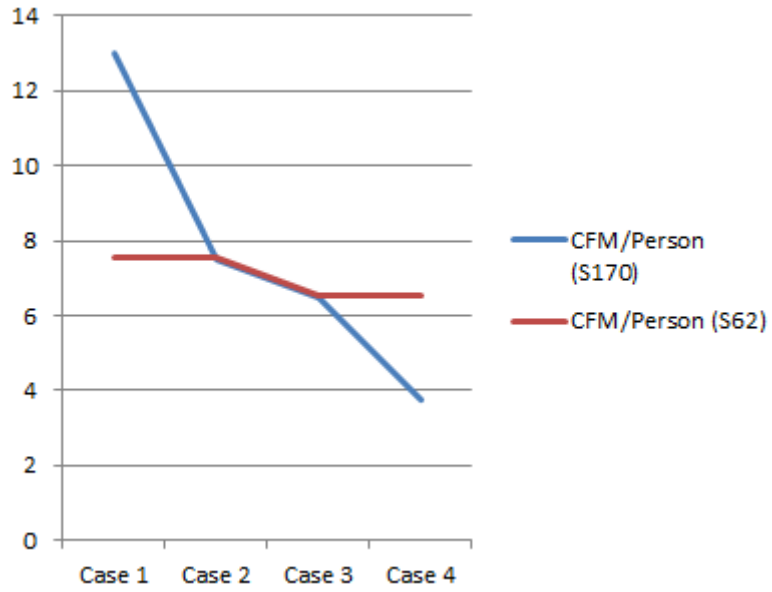

Figure 2 – Cfm per person of all cases, using both standards.

The percent difference in cfm per person required by each standard is shown in **Figure 3** below. For cases 2 and 3, the standards are aligned. Using S170, case 1 requires *72% more outside* air

than S62.1. This will increase energy the need for humidity control in the space. Using S170, case 4 requires *43% less outside air* than S62.1. The fully occupied room would not have minimumaly acceptable indoor air quality, as defined by S62.1.

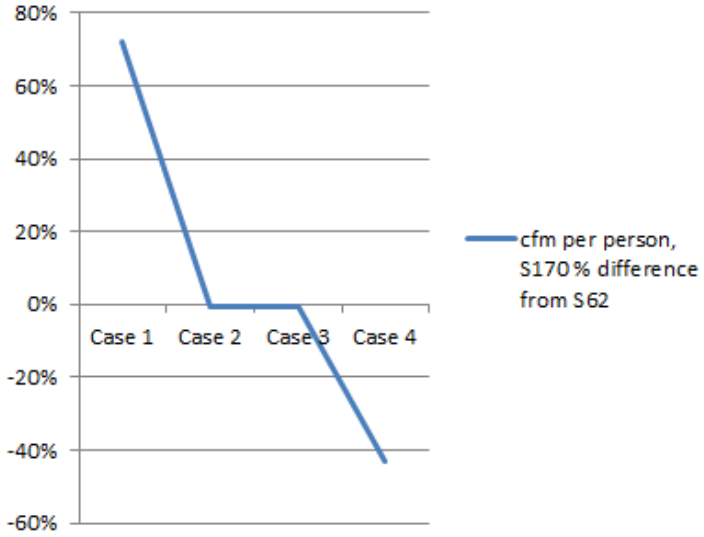

Figure 3 – Percent difference between S170 and S62.1 outside air cfm per person

If designers considered both S62.1 and S170 in the space, and chose the highest of the two, case 4 could be mitigated. However, an "ER Waiting Room" has no entry in the S62 VRP tables. S170 does not require designers to run dual calculations, nor would it be common practice to do so.

Please Note: A substantively similar RFI has been submitted to S62.1.

References:
[1] – CBECS. 2003. Overview of Commercial Buildings. Energy Information Administration

Interpretation: Standard 170 asserts that the need for outside air in ER and radiology waiting rooms is driven **entirely by volume** - that **occupancy has no bearing** on the need for outside air - though this is not aligned with normal ventilation design practice, can cause higher energy use when occupancy is low, and can cause sub-optimal indoor air quality when occupancy is high.

Question: Is this interpretation correct?

Answer: No.

Comments: The ventilation rates in these two room types have been selected to provide the dilution of respirable contagions such as TB from persons with undiagnosed TB. [Refer to CDC Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health Care Setting, 2005.]