

## DISCUSSION

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*D. Saum*<sup>1</sup> (written discussion)—(1) How is compliance with the 3-ACH standard administered? (2) How many houses are measured? (3) How many pass? (4) And, what happens if they fail?

*Å. Blomsterberg and L. Lundin* (authors' closure)—(1) Usually the customer requires that the standard is met and that someone runs a test using standard testing procedure. (2) Roughly one out of ten houses is tested. (3) In general, modern Swedish housing meets the requirement. (4) It depends upon what kind of agreement there is between the contractor and the customer.

*E. Krutson*<sup>2</sup> (written discussion)—(1) Are the 3-ACH (at 50 Pa) and the 0.5-ACH infiltration separate standards in Sweden? When was each introduced? (2) Can you state briefly why you prefer the constant concentration method of measuring air infiltration?

*Å. Blomsterberg and L. Lundin* (authors' closure)—(1) The 3 ACH (at 50 Pa) is an airtightness requirement for the envelope of a building, and the 0.5 ACH is the minimum required ventilation rate. The first requirement was introduced in 1977. A 4.5-ACH standard was introduced in 1975. The second requirement was introduced in the late 1960s. (2) The constant concentration technique we use for long-term measurements and for simultaneously monitoring individual rooms, because that is the method which gives the most accurate results under those conditions. The decay technique is useful for one-time tests of the overall house ventilation rate.

*E. Krutson* (written discussion)—Did you say that Parameter I is dimensionless? From its definition  $\text{ACH}/\sqrt{\Delta T}$  geometric factor, it seems to have the dimension  $\text{s}^{-1} \text{ } ^\circ\text{C}^{-1/2}$ . (2) You said that the best reference pressure for fan pressurization is the indoor pressure *before* testing. How is this done?

*Å. Blomsterberg and L. Lundin* (authors' closure)—I do not recognize any of these statements. I think they concern the paper by Boman and Lyberg.

*R. A. Grot*<sup>3</sup> (written discussion)—Can you give some details on the combustion of the mechanical ventilation rates to explain the uneven ventilation rates in each room?

*Å. Blomsterberg and L. Lundin* (authors' closure)—I am not quite sure that I understand the question. The uneven ventilation rates in each room in a house have different explanations depending upon the mechanical ventilation system. A house with an exhaust fan will have low ventilation rates in rooms with tight exterior walls, assuming the outlets to be located in the middle of the house and that the whole house is slightly depressurized. A tight house

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with a balanced ventilation system, where fresh air is supplied to each room, will have an uneven ventilation rate if the system is not well adjusted. The leakier the house, the larger the natural air infiltration will be.

*P. Giesbrecht*<sup>4</sup> (*written discussion*)—(1) Does the recommended Swedish ventilation rate of 0.5 ACH include the unintentional leakage through the envelope? (2) Are heat recovery units common in new Swedish homes?

*Å. Blomsterberg and L. Lundin* (*authors' closure*)—(1) Yes, the 0.5 ACH includes infiltration as well as mechanical ventilation. (2) Very common in new homes.

<sup>4</sup>Ener-Corp Management, Ltd., Winnipeg, Manitoba, Canada R3L 0K5.