

Lab 3. Air Exchange in Buildings (2.5 Points)

This assignment is designed to take a more detailed and analytical approach to the calculation of infiltration and air exchange in a house. Please show your work including key equations and variables.

1. Using the “Basic Model” estimate the infiltration (in cfm) attributed to a 20 square foot awning window on the second story of a rural farm house near Rochester, MN under design conditions. The window is mounted into a wood frame without caulk and has no weather stripping. Assume a 99% outside temperature, a 2.5% extreme wind speed, and a 72 degree indoor temperature.

2. Using the “Enhanced Model” estimate the design condition infiltration of a two story house on a basement with a flue in residential neighborhood in Duluth, MN. Assume the house has a flow coefficient of 5.2 cfm/inch of water and a flow exponent of 0.67 (corresponding to an effective leakage area 155 sq. in. at 4 pascals). Use 99.6% design conditions and the 5% extreme wind speed with an indoor temperature of 70 degrees. The house volume is 20,000 cu. ft.

3. Estimate the average total air exchange (in cfm and ACH) for the house in Problem 2 with a ...

a. 100 cfm balanced heat recovery ventilator that runs continuously.

b. 50 cfm balanced heat recovery ventilator that runs continuously and a 100 cfm bath fan that runs 50% of the time.

4. Any thoughts, surprises, challenges, or "ah-ha" moments?