

K. What Does Air Change Mean?

One **air change** occurs in a room when a quantity of air equal to the volume of the room is supplied and/or exhausted.

Air change rates are units of ventilation that compare the amount of air moving through a space to the volume of the space. Air change rates are calculated to determine how well a space is ventilated compared to published standards, codes, or recommendations.

Air changes per hour (ACH) is the most common unit used. This is the volume of air (usually expressed in cubic feet) exhausted or supplied every hour divided by the room volume (also usually expressed in cubic feet).

Airflow is usually measured in cubic feet per minute (CFM). This is multiplied by 60 minutes to determine the volume of air delivered per hour (in cubic feet).

To calculate room volume (in cubic feet), multiply room height (in feet) by the room area (in square feet). Room area is the room width (in feet) times the room length (in feet).

$$\text{Air Changes per Hour (ACH)} = \frac{\text{airflow per hour}}{\text{room volume}} = \frac{\text{CFM} \times 60 \text{ minutes}}{\text{cubic feet}}$$

A room may have two airflow values, one for supply and another for exhaust. (The airflow difference between these two values is called the offset.) To calculate the air change rate, use the greater of the two airflow values. For AIIRs, the exhaust should be greater than the supply.

Example of Air Change per Hour Calculation

An AIIR is 200 square feet in area and has a ceiling height of 9 feet. Airflow measurements indicate a supply airflow of 360 CFM and an exhaust airflow of 480 CFM. Does this room comply with the CDC recommendation that AIIRs have a minimum airflow rate of 12 ACH for new construction?

$$\text{Air change rate: } \frac{480 \text{ CFM} \times 60}{200 \text{ ft}^2 \times 9 \text{ ft}} = 16 \text{ ACH}$$

$$\text{Exhaust air offset: } 480 \text{ CFM} - 360 \text{ CFM} = 120 \text{ CFM}$$

As you can see, this room exceeds the CDC minimum requirement. The offset of 120 CFM is made up by air from outside the room.