

What is the Air Exchange Rate (AER)?

The air exchange rate (AER) refers to the number of times the air within a defined space, such as a room or building, is replaced with fresh air over a specific period, typically measured in hours. This metric is crucial for assessing indoor air quality and ensuring adequate ventilation in residential and commercial buildings.

In the UK house building, residential retrofit, home renovation, and extension sectors, the air exchange rate is a vital consideration for both new constructions and renovations. It directly impacts energy efficiency, occupant comfort, and health. A well-designed ventilation system should maintain an optimal AER to prevent the accumulation of indoor pollutants, moisture, and odours while ensuring that energy consumption is kept to a minimum.

Synonym: Ventilation rate

Explanation and Real-World Application

The air exchange rate is typically expressed in air changes per hour (ACH). For example, if a room has an AER of 2 ACH, it means that the entire volume of air in that room is replaced twice every hour.

In practical terms, achieving the right AER is essential for maintaining a healthy indoor environment. For instance, in a newly built home, the Building Regulations in the UK stipulate minimum ventilation requirements to ensure that indoor air quality is not compromised. This is particularly important in energy-efficient homes, which are often more airtight.

Example: In a retrofit project, upgrading windows and insulation can improve energy efficiency but may reduce natural ventilation. To compensate, mechanical ventilation systems with heat recovery (MVHR) are often installed to maintain an optimal AER while minimising heat loss.

Related Terms and Concepts

1. **Air Changes per Hour (ACH):** The unit of measurement for AER, indicating how many times the air in a space is replaced in one hour.
2. **Mechanical Ventilation with Heat Recovery (MVHR):** A system that provides controlled ventilation while recovering heat from extracted air, ensuring energy efficiency and optimal AER.
3. **Building Regulations Part F (Ventilation):** The UK regulation that outlines minimum ventilation requirements for residential buildings, including AER considerations.
4. **Indoor Air Quality (IAQ):** The quality of air within a building, directly influenced by the AER and the presence of pollutants, moisture, and odours.
5. **Airtightness:** The extent to which a building is sealed against uncontrolled air leakage, impacting the need for mechanical ventilation to maintain AER.
6. **Passive Ventilation:** Natural airflow through windows, vents, or other openings, which can contribute to AER without mechanical systems.
7. **Condensation Risk:** The likelihood of moisture accumulation in a building, which can be mitigated by maintaining an appropriate AER.