What is Air Permeability?

Air permeability is a measure of how much air leaks through the building envelope (walls, roof, floors, windows, and doors) under a specified pressure difference, typically 50 Pascals (Pa). It is expressed in cubic metres per hour per square metre of envelope area ($m^3/(h.m^2)$) at 50 Pa. A lower air permeability value indicates a more airtight building, which is crucial for energy efficiency, thermal comfort, and indoor air quality.

In the UK, air permeability is a key metric in assessing the energy performance of buildings. It is particularly relevant in new builds, residential retrofits, and home extensions, where compliance with **Part L (Conservation of Fuel and Power)** of the Building Regulations is mandatory. The Approved Document L1A (for new dwellings) and L1B (for existing dwellings) set maximum allowable air permeability rates. For example, new builds often aim for an air permeability of $\leq 5 m^3/(h.m^2)$ at 50 Pa, though some projects target lower values for enhanced energy efficiency.

Synonym(s): Air leakage rate, building airtightness

Practical Example:

A homeowner in the UK is retrofitting a Victorian terrace house to improve energy efficiency. An air permeability test is conducted, revealing a value of $8 m^3/(h.m^2)$ at 50 Pa. To meet Part L requirements, the homeowner installs airtightness measures such as sealing gaps around windows, doors, and loft hatches, and using airtight membranes in walls and roofs. A retest shows an improved air permeability of $4 m^3/(h.m^2)$ at 50 Pa, ensuring compliance and reducing heat loss.

Related Terms:

1. **Building Envelope**: The physical barrier between the interior and exterior of a building, including walls, roofs, floors, windows, and doors.
2. **Airtightness**: The degree to which a building prevents uncontrolled air leakage through its envelope.
3. **Part L (Building Regulations)**: UK regulations governing the conservation of fuel and power in buildings.
4. **Blower Door Test**: A diagnostic tool used to measure air permeability by depressurising or pressurising a building.
5. **Thermal Bridging**: Heat transfer through materials that bypass insulation, often exacerbated by poor airtightness.
6. **Ventilation Strategy**: A planned approach to ensuring adequate indoor air quality, balancing airtightness with controlled ventilation (e.g., Mechanical Ventilation with Heat Recovery (MVHR)).
7. **Energy Performance Certificate (EPC)**: A document that rates a building's energy efficiency, influenced by air permeability.