Why is uncontrolled infiltration not sufficient for ventilation?

Uncontrolled infiltration is generally not sufficient for effective ventilation in UK buildings due to its unreliability, variability, and inability to meet specified minimum fresh air requirements, leading to poor indoor air quality (IAQ) and potential damp and mould issues. It's an accidental process, not a designed solution, making it impossible to guarantee the necessary air changes for a healthy home, especially in increasingly airtight, modern properties.

Unreliability and Lack of Control

Infiltration, commonly referred to as **air leakage**, is simply the accidental flow of outside air into a building through unintentional gaps, cracks, and openings in the fabric. This process is fundamentally unreliable because it depends entirely on fluctuating external factors, which is why relying on it for proper **UK building ventilation** is a massive gamble.

The Whims of Weather

The rate at which air infiltrates a building is primarily governed by the **pressure difference** (ΔP) between the inside and the outside. This pressure difference is, in turn, dictated by the weather.

- **Wind Speed and Direction:** Wind literally pushes air into one side of the building and sucks it out of the other. The effect is highly variable; a slight breeze might provide a tiny trickle, while a strong gale could cause excessive heat loss and uncomfortable **draughts**. Therefore, on calm days, the crucial flow of **fresh air** can drop to near zero, leaving occupants with stagnant, polluted air.
- **The Stack Effect:** This occurs due to the temperature difference between the inside and outside. Warm air is less dense and rises, creating lower pressure at the bottom of the building, which draws in colder outdoor air. In the UK, particularly during mild weather, this effect is often too weak to drive sufficient air exchange, yet it can be aggressive on a cold winter's day, leading to excessive energy waste.

Since both wind and temperature are constantly changing, the **air change rate** provided by infiltration is never constant or predictable. This inherent variability makes it unsuitable for continuous and controlled **ventilation**.

Uneven Air Distribution

Leakage paths in a building are typically random. You might have a leaky window in the living room but a very tight wall in the bedroom.

- This randomness results in **uneven ventilation**. Areas remote from the main air leakage sites, such as centrally located or internal rooms, often receive minimal to **no fresh air**.
- This patchy distribution means that while one part of the house may be well-ventilated (and perhaps draughty), another could be suffering from dangerously low **indoor air quality (IAQ)**, creating pockets where pollutants and moisture accumulate unnoticed.

Inability to Meet Statutory Standards

Modern building practice and regulations in the UK are clear: continuous, controlled ventilation is essential. Uncontrolled infiltration simply cannot guarantee the minimum rates necessary for health and thermal comfort.

UK Building Regulations Part F

The **Building Regulations Part F (Ventilation)** for England and Wales mandates specific, minimum continuous rates of fresh air supply. These regulations were put in place to ensure a healthy living environment, and the rates are non-negotiable.

- **Data/Fact:** Whole-dwelling ventilation rates are often calculated based on the number of bedrooms or a continuous low rate (e.g., around **0.3 air changes per hour (ACH)**) to ensure basic fresh air for the occupants. Uncontrolled infiltration is rarely engineered or guaranteed to meet these **minimum specific flow rates** under all weather conditions, making compliance impossible.
- **Wet Room Requirements:** Furthermore, Part F demands specific **extract ventilation rates** for 'wet rooms'—kitchens, bathrooms, and utility rooms—where high levels of moisture and cooking pollutants are generated. For example, a bathroom may require a minimum continuous extract rate of **8L/s**. A crack under a door cannot be relied upon to deliver this specific, high-volume flow rate.

Poor Indoor Air Quality (IAQ)

The primary purpose of **domestic ventilation** is to dilute and remove internal pollutants. Infiltration fails spectacularly at this.

- **Pollutant Accumulation:** Activities like breathing, cooking, and using cleaning products release **carbon dioxide (CO2), volatile organic compounds (VOCs), and excess moisture**. Without a purpose-provided system, these pollutants build up.
- **Data/Fact:** High CO2 levels, especially those exceeding **1000 parts per million (ppm)**, are directly linked to symptoms like lethargy, poor concentration, and headaches—a phenomenon commonly known as 'sick building syndrome'. Relying on infiltration makes it impossible to guarantee the necessary **air changes** to keep CO2 and other pollutants consistently at safe levels, particularly in bedrooms overnight or when the house is fully occupied.

Moisture Management and Damp Risk

One of the most critical failings of relying on infiltration is its inability to manage **moisture** generated within the home, which is a major driver of **damp and mould** in the UK.

Condensation and Mould Growth

Everyday life generates a staggering amount of moisture.

- **Data/Fact:** The average UK household produces about **10−15 litres of water vapour per day** from activities like cooking, bathing, drying clothes, and even breathing. If this moisture-laden air is not swiftly and continuously extracted, it increases the **relative humidity (RH)** indoors.
- When this warm, moist air meets a cold surface (like a window or a cold spot on an external wall), **surface condensation** occurs. This water creates the perfect breeding ground for

mould.
- Effective, **continuous ventilation**, particularly targeted **extract ventilation** (such as a system like **ARIA** in wet rooms), is essential to remove this moisture at its source. Uncontrolled infiltration is utterly random; it may or may not provide air flow near the source of moisture, nor will it provide the necessary continuous flow rate to effectively flush the moisture out of the dwelling.

Conflict with Energy Efficiency Goals

The drive for greater **energy efficiency** in the UK has fundamentally changed how buildings are designed, making the idea of relying on infiltration obsolete and contradictory.

Airtightness Mandates

To conserve heat and reduce energy bills, new UK buildings are designed to be intentionally highly airtight. This means actively and drastically reducing infiltration.

- **Data/Fact:** Modern UK new builds must meet stringent **air permeability** targets, often aiming for **less than 5m3/(h·m2) @ 50Pa**, with very low-energy homes pushing this as low as **3m3/(h·m2) @ 50Pa** or even lower.
- By making buildings this tight, infiltration is almost entirely eliminated, which is excellent for insulation and heat retention. **Therefore, a deliberate, purpose-provided ventilation system** (such as **RESPIRO** (MVHR) or **FLUXO** (srMVHR)) becomes an absolute necessity to bring in the required fresh air. A building leaky enough to rely on infiltration would be woefully non-compliant with energy efficiency standards.

Relying on uncontrolled infiltration is like trusting a leaky sieve to measure water—it’s inherently inaccurate and unreliable for the serious task of maintaining a healthy home environment.

To ensure your UK property maintains healthy indoor air quality, manages moisture effectively, and remains energy-efficient, you must always choose a purpose-designed mechanical ventilation system over the random and insufficient process of air infiltration; discover the right continuous solution for your home on our website today.