



4-6 May 2022, Conference, Athens, 41st AIVC - ASHRAE IAQ
joint conference

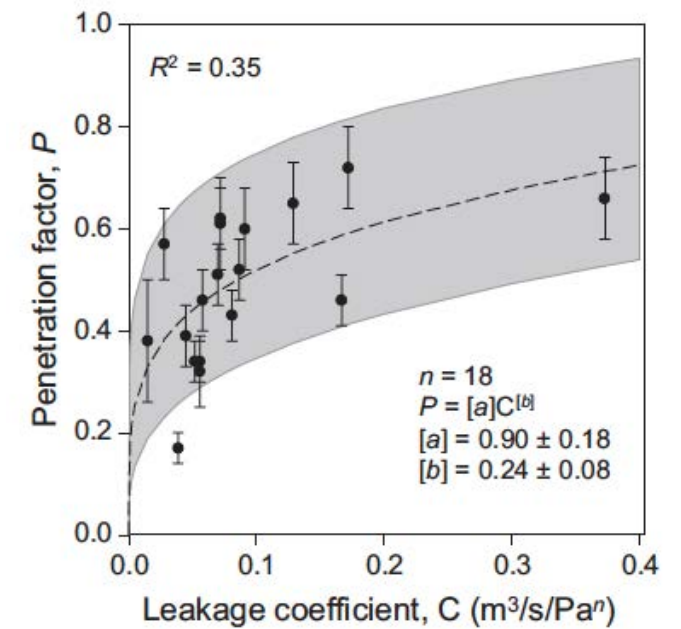
Building Airtightness and IEQ

Iain Walker

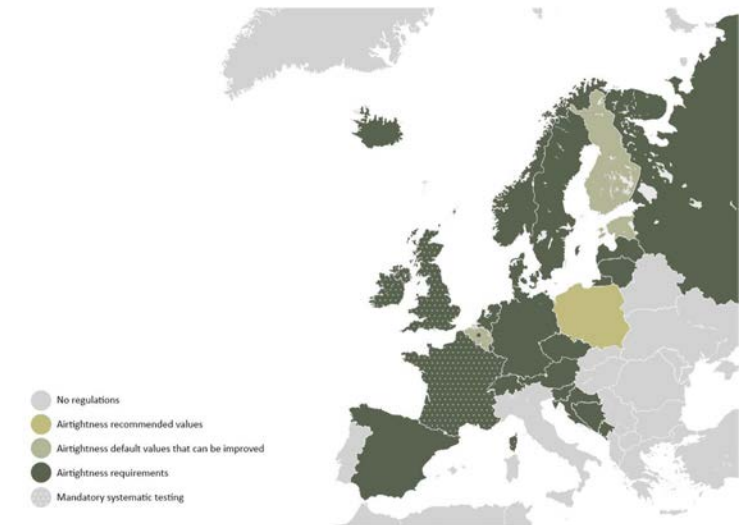
Better Airtightness

- Lower heating/cooling energy use
- Better comfort: fewer drafts & better thermal control
- Less pollutants from outside: Pollen, PM2.5 (from ICEs), and occasional hazards such as wildfires, industrial sources, ozone
- Less noise from outside
- With mechanical ventilation: more consistent and reliable air flows

Often regulated for new construction



Stephens and Siegel, Penetration of ambient submicron particles into single family residences and associations with building characteristics. 2012. *Indoor Air*. doi:10.1111/j.1600-0668.2012.00779.x



Poza-Casado, I., Cardoso, V., Almeida, R., Meiss, A., Ramos, N., and Padilla-Marcos, J. M. 2020. Residential buildings airtightness frameworks: A review on the main databases and setups in Europe and North America. *Building and Environment* <https://doi.org/10.1016/j.buildenv.2020.107221>

Better Airtightness

A tighter envelope means:

- More reliance on mechanical ventilation
 - Are they installed and operating correctly?
 - Are they maintained?
 - What if they fail?
- Less drying potential for building envelope assemblies



Figure 9: Ridge sheathing degradation with dense pack cellulose in northern California



Multifamily Compartmentalization

Compartmentalization = internal leakage

- Harder to measure directly

Less leakage:

- Isolates laundry, cooking, refuse and other common spaces, e.g., toilets
- Reduces unit to unit leakage
 - Odors - #1 complaint in multifamily buildings: from smoking and cooking
 - Moisture
 - Health: Particles + Infectious diseases

