

Smart ventilation arrives: renewing air without losing heat

Balanced mechanical ventilation systems renew indoor air continuously, recover its heat and filter outdoor pollutants. PAPIK Group contributed to a La Vanguardia report explaining how they work.

Airing a home every day, even for just ten minutes, is a good habit. It is not only a matter of odours: indoor air accumulates polluting particles emitted by climate systems, appliances, cleaning products and construction materials. Exposure to them is associated with headaches, weakness, fatigue or nausea and, over the long term, even respiratory and cardiovascular problems.

The difficulty is that every time a window is opened, the heat generated in winter escapes, or the cool air in summer. And the air coming in from outside often arrives loaded with pollutants, especially in large cities or in areas with heavy traffic or nearby industry. Such is the case of the Barcelona Metropolitan Area, where at the time this article was published a pollution alert was declared, the sixth in three years.

If ventilation is necessary but doing it means losing energy and risking the entry of even dirtier air, the answer lies in mechanical ventilation systems. These units, then still little known in Spain, are gradually gaining ground. PAPIK Group contributed to a report by journalist Lorena Farràs Pérez in La Vanguardia devoted precisely to this technology.

Why opening a window is not enough

Natural ventilation solves air renewal at the price of two costs that are hard to avoid. The first is energetic: opening a window dissipates outdoors the temperature the home has spent resources reaching. The second is sanitary: in settings with poor outdoor air quality, opening up can worsen the indoor environment rather than improve it. Air pollution, both outdoor and indoor, is harmful to health, above all through accumulation over time.

How a balanced system works

Mechanical ventilation systems work with two simultaneous flows. They draw air from outside, filter it, pass it through a heat exchanger and inject it into the various rooms of the home, with the exception of the kitchen and bathroom. In these two rooms the process is reversed, because that is where the air is most stale: indoor air is collected there and, after passing through the exchanger, is expelled outdoors.

The result is air that circulates permanently throughout the house without any perceptible draught, so the whole home is ventilated continuously. As Papik Fisas, of PAPIK Group, summarised it, the practical effect is that stepping out of the shower brings fresh air rather than steam, and that odours disappear throughout the house.

The heat exchanger

The heat exchanger is the component that prevents almost all thermal loss: it takes the heat from the air being expelled and transfers it to the fresh air coming in. According to José Ramon Ferrer, head of the firm Zehnder in Spain, in the most modern units efficiency reaches 90 per cent, meaning that 90 per cent of the heat in the outgoing air is recovered.

Air filtration

The filter is responsible for purifying the air that comes in from outside. According to Zehnder, most people who take an interest in mechanical ventilation do so precisely in search of better air quality. Prior filtration is especially useful for people with allergies, respiratory problems or multiple chemical sensitivity, as it blocks the entry of dust and pollen. As a side effect, it noticeably reduces the dust that accumulates in the home.

Energy efficiency and cost

From an energy efficiency standpoint, having a mechanical ventilation system is, according to the PAPIK Group architect, about fifty times more efficient than opening a window. Zehnder puts the potential saving in heating and cooling at up to 50 per cent. All of this with a consumption equivalent to that of a 30-watt bulb.

For a home of around 100 square metres, a mechanical ventilation system can cost about 8,000 euros, according to the experts consulted. The installation takes up a certain volume because of the ducts running through the house, so the ideal scenario is new construction, where the installation is already contemplated in the design. A full retrofit is the other route to incorporating it into an existing home.

Mechanical ventilation and the Passivhaus standard

For a mechanical ventilation system to work properly, the home must be very well insulated and highly airtight. For this reason these units are closely linked to houses built to the Passivhaus standard, where the envelope and airtightness are designed from the outset. In the construction of an Eskimohaus home, balanced ventilation with heat recovery is not a later addition but an integrated part of the system.

Mechanical ventilation does not replace good home design, it completes it: only a well-insulated, airtight envelope makes it possible to renew air continuously without squandering the energy that is so costly to reach.