

Mediterranean Passivhaus, the cooling-first paradigm

The Passivhaus standard was born in the cold German climate. Adapting it to the Mediterranean climate requires inverting priorities, designing passive cooling, shading the south orientation and incorporating thermal mass. Technical guide for the Catalan, Balearic and Andorran climate.

Why the German Passivhaus does not transfer directly

In Frankfurt or Darmstadt, the average January temperature sits around zero degrees, while the July average barely reaches twenty degrees. Annual heating demand far exceeds cooling demand: if we size the house to minimise winter losses, summer is resolved almost by default. In the Catalan climate, by contrast, the July and August average in Sant Cugat del Vallès sits between twenty-four and twenty-seven degrees, with daily peaks routinely above thirty degrees and, during heatwaves, sustained for several days at thirty-five or more. The summer interior-exterior gradient is of a magnitude comparable to that of winter, and the Passivhaus designed with the original logic tends to overheat.

The origin of the problem is physical: a well-insulated and airtight envelope conserves heat regardless of its sign. In winter it protects the interior energy from the exterior cold; in summer, if heat enters (through poorly protected windows, inverse thermal bridges, deficient night ventilation), the envelope conserves it in exactly the same way. The house becomes a thermos, and a thermos with heat inside does not cool down easily.

Cooling-first as a project principle

The first paradigmatic change is to invert the design hierarchy. Instead of "minimise winter losses and then see how summer resolves itself", the Mediterranean logic starts from "minimise summer gains and then see how winter resolves itself". The operational result usually coincides with the German Passivhaus in insulation and airtightness, but differs significantly in four areas: orientation, shading, ventilation and thermal mass.

This inversion is not aesthetic but numerical. The annual load balance calculated with PHPP (Passive House Planning Package, the official tool of the Darmstadt Institute) shows that in the Mediterranean climate the cooling demand can equal or exceed the heating demand. A well-designed project cuts both without having to oversize any active system.

Structural shading of the south orientation

In Germany, south-facing windows are energy assets: they provide more solar energy than they lose over the course of the year. In Catalonia, this reading holds in winter but reverses in summer. An unprotected south window can provide one thousand watts per square metre at noon in July; multiplied by a generous surface it becomes a disproportionate heat input.

The solution is calibrated structural shading. Overhangs sized according to the local solar path (at the latitude of Barcelona, an overhang of approximately one metre above a two-metre window blocks the summer sun but lets in the winter sun), orientable exterior shutters, movable louvres, vegetal pergolas with deciduous plants that provide shade in summer and let the sun through in winter. The usual design rule is: each square metre of south window needs its exterior shading system, not just the interior one. An interior blind blocks the radiation but the heat has already entered the glass.

Controlled daytime ventilation and free night ventilation

HRV (mechanical ventilation with heat recovery) as conceived for cold climates works perfectly in Catalonia during winter. In summer, however, the performance changes. The system continues to renew the interior air with the usual filtering and quality, but there are two additional strategies that combine with HRV.

The first is the summer bypass: most Zehnder and equivalent systems incorporate an automatic bypass that, when the exterior temperature drops below the interior one (typically from eleven at night in Catalonia), introduces exterior air without passing through the heat exchanger, cooling the house passively. The second is cross night ventilation: opening windows on both sides during the hours of minimum exterior temperature and closing them first thing in the morning, cooling the thermal mass of the house with the cool early-morning air.

In practice, a well-designed Mediterranean Passivhaus house can maintain interior temperatures between twenty-three and twenty-six degrees throughout the summer without active air conditioning, thanks to the combination of shading, bypass and night ventilation. We detail it in the article on [Passivhaus ventilation](#).

Thermal mass as a regulator

The classic German Passivhaus is often built with a lightweight structure (timber frame) and little thermal mass. In the Mediterranean climate, thermal mass is a first-order design asset. A house with concrete slabs, interior walls of ceramic block, interior mortars or clay renders absorbs heat during the summer peak hours and releases it slowly at night, smoothing the daytime oscillations that would affect a lightweight construction.

At PAPIK Group we usually combine a lightweight timber-frame structure in the exterior envelope (lightweight, quick to execute and with a low footprint) with thermal mass concentrated in strategic interior walls and in the slabs. This combination, which draws on Mediterranean building traditions (the Catalan or Mallorcan rural house is, historically, an example of well-used thermal mass), is technically compatible with the Eskimohaus® system and contributes in a measurable way to summer comfort.

Hybrid active cooling when needed

In extreme episodes or in difficult orientations, passive cooling may prove insufficient. The Mediterranean strategy integrates hybrid active cooling: reversible aerothermal energy with reduced sizing (between two and four kilowatts for a one hundred and eighty square metre Passivhaus house, against the five to eight kilowatts of an equivalent conventional construction), intelligent control that prioritises cooling with daytime photovoltaics and manages night ventilation automatically, and, optionally, cooled underfloor heating using the same hydraulic installation that serves for heating in winter.

The objective is not to eliminate active cooling but to reduce it to a marginal complement of passive cooling. The annual electricity consumption associated with cooling of a well-designed Mediterranean Passivhaus usually sits between two and six kilowatt hours per square metre, against the twenty to forty of a conventional construction.

Materials adapted to the local climate

Beyond structure and thermal mass, two specific material elements have design relevance in the Mediterranean climate. The first are the light exterior finishes, which reflect radiation instead of absorbing it: whites, light greys or light earth tones, characteristic of the Balearic and Empordà architectural tradition, reduce the surface temperature by up to eight degrees compared to dark finishes. The second are the hygroscopic interior renders (clay, lime, wood without synthetic varnish), which stabilise the ambient humidity and, indirectly, improve the thermal sensation without the need to lower the temperature further.

These materials are not exclusive to the Mediterranean Passivhaus, but their coherent integration with the cooling-first logic and thermal mass forms part of what distinguishes the Passivhaus adapted to the Catalan climate from the simple import of German standards. See the detail in the article on [sustainable materials](#).

Frequently asked questions

Is there a specific Passivhaus certification for the Mediterranean climate?

The Darmstadt Institute does not issue a differentiated geographic certification, but the PHPP methodology recalculates all variables according to the local climate data entered. A Passivhaus house in Sant Cugat del Vallès is certified with the same rules as one in Darmstadt, but the load balance is structurally different.

What cost difference does adapting it to the Mediterranean climate involve?

The adaptation does not translate into a significant additional cost if it is planned into the project. Overhangs and shading integrated into the design cost less than adding them retroactively. Thermal mass is resolved with usual building materials. Hybrid active cooling usually partially replaces the investment in conventional systems.

Can a house with a lot of natural light be a Mediterranean Passivhaus?

Yes. The rule is not to reduce windows but to protect them. A project with large south openings is perfectly compatible with cooling-first if the exterior shading is sized appropriately. Clients who prioritise natural light do not have to give it up to reach the standard.

Does Passivhaus work in the Balearic Islands or in Andorra?

Yes, in both cases. In the Balearic Islands the Mediterranean logic is accentuated. In Andorra, at altitude, the regime is closer to the original continental one, and the heating-first approach becomes dominant again. PAPIK Group adapts the sizing to each location through the specific PHPP calculation.

If you are considering a Passivhaus project in the Mediterranean climate and want to understand the technical decisions relevant to your case, an indicative project assessment makes it possible to define priorities before starting the project.

[Configure the budget for my project](#)

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[A house in the Montseny: the K-Alzina project](#)

[Five key technologies of the 2026 Passivhaus](#)

[The five principles of Passivhaus](#)

[Why do you breathe better in a Passivhaus house?](#)

[Sustainable materials for Passivhaus](#)