Catalan roof

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The Catalan roof,[1] Catalan roof[2] or Catalan ventilated roof,[3] is a specific type of walkable flat roof or integrated roof that is distinguished by its particular construction system, traditionally used in the architecture of Catalonia and other areas of influence. Unlike sloping roofs with visible tiles, the Catalan roof offers a more modern and clean exterior appearance, aesthetically integrating into the façade of the building. Due to its numerous aesthetic and architectural advantages and its versatility, the Catalan roof has been widely adopted in high-end residential constructions. [4]

Its main feature, which differentiates it from other flat roofs, is the use of roof partitions (or "partition with air chamber") on the structural slab, which create an air chamber that is essential for thermal insulation and ventilation before the installation of the final tile or stoneware finish.

Distinctive features

The search for architectural solutions that optimised space and aesthetics led to the popularisation of the Catalan roof. This technology, which replaces traditional tiles, allows the creation of visually cleaner projects that are integrated into the urban landscape. [5] Apart from the aesthetic aspect, the Catalan roof offers several functional advantages, such as a greater thermal and acoustic insulation capacity, especially when adopted together with thermo-acoustic tiles. [6]

The Catalan roof is a versatile and efficient solution from a construction point of view, with several advantages in terms of aesthetics, functionality, durability and interior comfort. However, its assembly requires careful design and quality workmanship to ensure the proper functioning of the structure. [7]

If installed in colder climates, subject to the accumulation of large amounts of snow, their structure must be designed[8] to withstand the additional weight load exerted by the ice throughout the winter period. [9]

Another important structural load factor to take into account when calculating the dimensions of the structure of these roofs is the force exerted by the winds. [10][11] However, due to the reduced presence of interlocking points between the tiles, the Catalan roof tends to present fewer problems in terms of the appearance of infiltrations and leaks. [12] The presence of the parapet also provides additional protection from winds, making these terraces more resilient in situations where severe storms occur. [12]

The Catalan cover, in particular, offers:

Modern and clean aesthetics: By not having externally visible tiles, it allows for more visually refined designs that blend harmoniously into the urban landscape and high-end residential constructions.
Specific insulation and ventilation: The presence of the roof trays under the final floor creates an air chamber that improves the thermal insulation of the building, reducing heat transfer between the interior and exterior, and avoiding condensation problems.
Functional versatility: In addition to being a walkable space, its design allows for a greater capacity for thermal and acoustic insulation, especially if combined with suitable insulating materials.

Like any flat roof, its assembly requires a precise design and quality execution to ensure its correct functioning, especially with regard to water evacuation.

Construction elements

A Catalan roof shares many elements with other flat roofs, but integrates specific components that define its particularity:

Load-bearing structure: Generally a reinforced concrete bottom slab, designed to support not only the weight of the roof (including the roof vault system, the tiles, the waterproofing layer and the mortars), but also additional loads such as people, furniture or equipment.
envanets de sostremort: It is the key element that defines the Catalan roof. They consist of small brick walls or partitions, arranged regularly on the structural slab, forming a grid of cells or "rabbits". These partitions support the upper flooring and create a ventilated air chamber, crucial for thermal insulation and condensation prevention.
Thermal insulation: It is often supplemented with layers of insulating material (such as extruded polystyrene or rock wool) to improve energy efficiency.
Slope formation: Despite being called "flat", every roof must have a slight slope (generally imperceptible) to ensure correct drainage.
Waterproofing: Essential to prevent leaks. Materials such as asphalt sheets, synthetic membranes (PVC, EPDM) or liquid systems (polyurethane, PMMA) are used.
Surface finish: Tiles or stoneware are the most common, chosen for their resistance to weathering.
Parapet: It is the perimeter wall that protects and hides the construction system, also acting as a security railing.

Advantages and considerations

The Catalan roof offers several advantages:

Functionality: They allow the space to be used as a walkable or leisure area.
Wind resistance: The perimeter parapet offers additional protection.
Lower risk of leaks: If it is well designed, it can be more watertight than a traditional roof.
Snow loading: In cold climates, it needs to be designed to support the extra weight.

Comparison with traditional roofs (conventional roof)[13][14][15]

CharacteristicCatalan coverConventional roof

Aspect
Modern, clean, continuous
Traditional, with exposed tiles

Thermal/acoustic insulation
Major (thanks to the air chamber)
Minor (depends on additional insulation)

Ease of use
Walkable (usable space)

Not passable (only for maintenance)

Drainage
Depends on subtle slopes
Best (steep slopes)

Snow resistance
Requires specific design
High (due to inclination)

Final cost
Generally higher
More accessible

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