INSTALLING SOLAR PROTECTION DEVICES

HAZARD

HEAT

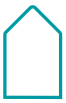
IMPLEMENTATION STEP

CONSTRUCTION

RENOVATION

BUILDING IN OPERATION

AREA OF ACTION



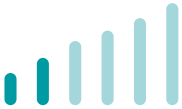
ENVELOPE

COSTS

€ € €

low medium high

LEVEL OF SKILL



low

While it can be an advantage for passive heating in winter, solar radiation is considered a major nuisance in summer. When the sun radiates on a building's glazed and opaque walls, it heats up the interior and reduces the thermal comfort of its occupants. Judicious installation of solar protection devices makes it possible to protect the building envelope in summer, while retaining the benefits of radiation in winter. Shading devices can be fixed or removable.

IMPACTS

Solar protection devices block direct solar gain, particularly on glass walls, which are the building's thermal weak points, thereby preserving the thermal comfort of occupants in summer.

Through ingenious orientation systems that take into account the different path of the sun in summer and winter (the sun is higher and further north in summer), solar protection equipment can also maximise passive winter heating by allowing winter sunlight to penetrate.

Although installing internal solar protection (blinds or curtains) is one solution, we strongly recommended that you opt for external solar protection, which is much more effective.

INSTALLATION GUIDE

Various fixed external solar protection devices can be installed, such as awnings (a), sunbreakers (b), louvres (c), or roof overhangs or upper storey balconies (d).

You can also install **removable external solar protection devices** such as horizontal sunshades, shutters and external blinds.

It's a good idea to use devices that both **block summer sunlight and allow winter sunlight to penetrate**: vertical sunbreakers, removable devices, and appropriately sized fixed devices (to avoid blocking winter sunlight).

When choosing solar protection systems, it's important to take into account atmospheric disturbances (wind, rain) and the behaviour of building and street users . For example, avoid fragile devices, such as canvas, if the building is exposed to strong winds or subject to vandalism.

If using internal solar protection, such as opaque fabric or blinds, opt for a light colour and ensure that it covers the entire surface of the windows.

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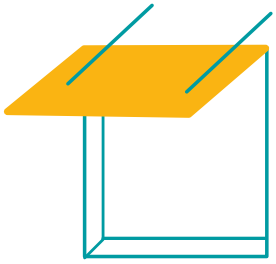
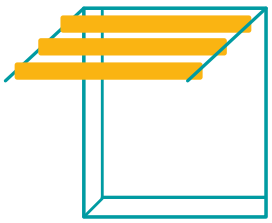
MAIN OUTDOOR SOLAR PROTECTION DEVICES

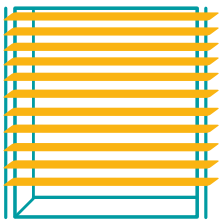
Awning (a): opaque horizontal protection integrated into the building structure



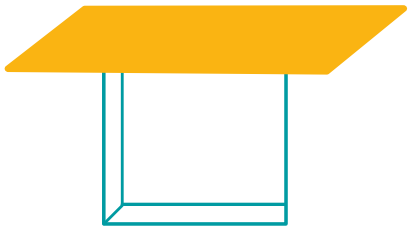
Sunbreaker (b): composed of vertical or horizontal slats arranged on a frame



Louvres (c): composed of inclined slats arranged on the façade



Roof and balcony overhangs on upper storeys (d): protect windows and part of the walls from the sun's rays.



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WEAK POINTS AND STRONG POINTS

⊕ The installation of solar protection devices should ideally be part of a **strategy to reduce the building's cooling requirements**, which involves improving its protection against solar radiation (better insulation of opaque and glass walls, high-albedo exterior coating, etc.).

⊖ Care should be taken to select and position solar protection devices so that they still allow **daylight into the building**. The aim is to preserve the comfort and well-being of occupants and avoid increasing energy consumption through more frequent use of lighting.

⊖ Solar protection systems require **regular maintenance and adjustment**. Inadequate maintenance can reduce their effectiveness over time, increasing vulnerability to climatic variations.

Façade of the Suravenir building in Brest, with sun-breaking blade caps

REAL-LIFE EXAMPLE

CRÉDIT MUTUEL ARKÉA

BUILDING: SURAVENIR HEADQUARTERS, BREST
SURFACE AREA: 8,500 M², BASEMENT AND GROUND+2
USE: TERTIARY (OFFICES)
COST: €500,000

The head office of Suravenir (the Crédit Mutuel Arkéa Group's life insurance and provident savings subsidiary) is located in Brest (Brittany), in a building of almost 8,500m² managed by the Crédit Mutuel Arkéa Group. Built in 1999, this office building, which accommodates more than 530 occupants, was initially heated and air-conditioned by a water loop system on a heat pump with a gas back-up. As the system aged, it began to malfunction and generate high maintenance costs. To find a solution, a DTS (Dynamic Thermal Simulation) study and a shadow study were carried out in 2013 to analyse the building's behaviour throughout the year and over the different seasons, and determine possible technical improvements. The conclusions showed that the installation of solar protection devices, coupled with a night-time ventilation system, would ensure summer comfort by avoiding the need for air conditioning, while retaining sufficient light for the comfort of occupants in winter. Skylights have therefore been positioned over the glass walls. These are made up of manually adjustable louvres, which also have a low wind load. The installation work was completed in 2015. The entire project resulted in a reduction in annual energy consumption of around 13%, and lower maintenance costs.

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MONITORING INDICATORS

MONITOR MY ACTIONS FOR CLIMATE CHANGE ADAPTATION

+/– : Quantitative indicator ★ : Qualitative indicator

INDICATORS OF MEANS	INTERPRETATION
+/– Percentage of windows fitted with fixed and/or removable external solar shading devices (%)	To be maximised

INDICATORS OF RESULTS	INTERPRETATION
+/– Comparison between the indoor temperature at night when using solar protection devices during the day and that of a control situation* (°C)	Indoor temperature at night when using solar protection devices during the day < that of control situation*
+/– Comparison between the annual accumulation of degree-hours of discomfort and that of a control situation (°C.h.) * using the RITE tool	Cumulative annual degree-hours of discomfort < that of control situation*
+/– Comparison between the indoor temperature during the day when using solar protection devices and that of a control situation* (°C)	Indoor temperature during the day when using solar protection devices < that of control situation*

**The control situation is defined by the parameters set to isolate the influence of the adaptive action (similar conditions: weather, time of measurement, space, etc.).*

REGULATION / CRITERIA

- The RE2020 defines two thresholds that the **"inside temperature" of the building** must not exceed to avoid discomfort. At night, the temperature threshold is 26°C. During the day, the adaptive temperature threshold is between 26° and 28°C. Above these thresholds, every additional degree in the building is considered uncomfortable for the occupant. This is known as **Degree-Hour (DH) discomfort**. During the day, this threshold is constant without necessarily being identical to that of the previous day: it varies from one day to the next to take into account the human body's ability to adapt to high temperatures after a succession of hot days, within a limit of +2°C compared with the consensus threshold of 26°C. The DH indicator therefore takes into account the climatic conditions of past days, and makes it possible to propose a relative comfort level that is closer to what residents actually feel.

TOOL

- *Cerema* has designed the *RITE* tool (*Risque d'Inconfort Thermique d'Été* - Risk of Thermal Discomfort in Summer) to rapidly evaluate the indoor summer comfort of new buildings and renovations in response to climate change. Easy to use by all actors in the building sector, RITE has so far only been developed for residential housing.

FIND OUT MORE

ADEME (French environment agency) and *AFD* (French Development Agency) (2021), Urbain Cooling Solutions

Cerema (2022), *Le Cerema publie un outil permettant de calculer les bénéfices été/hiver d'une protection solaire de baie*

Cerema (2023), *Evaluation du Risque d'Inconfort Thermique d'été face au changement climatique*

Plus fraiche ma ville (2023), *Structure d'ombrage*

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