outPHit: Robust planning for a high level of summer comfort with rising temperatures

As a result of global warming, protection against overheating is becoming an increasingly relevant subject, especially as high indoor temperatures are not only a question of comfort but also have a significant impact on health. Optimising the building design in line with local climate conditions has a fundamental influence on thermal comfort in a building in the summer and its resilience against the risk of overheating.

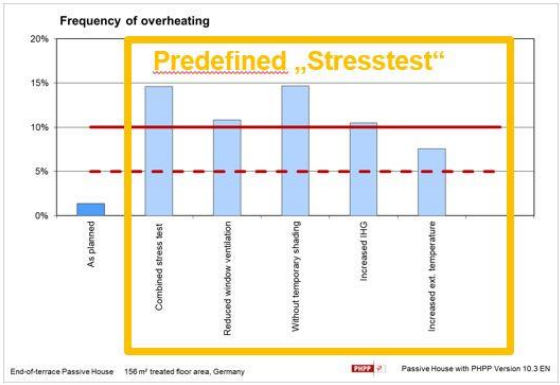
Verifying the high level of comfort throughout the year is an integral part of the Passive House concept. As part of the quality assurance measures to guarantee a high level of thermal comfort in summer, the frequency of overheating is limited in Passive House buildings: the indoor temperatures in a Passive House building may not exceed 25 °C for more than 10 % of the hours in a year. A frequency of overheating of less than 5 % is recommended. During the planning phase with the energy balance tool PHPP, planners can reliably ensure that these targets are met.

Planning recommendations for a high level of summer comfort

Heat gains can cause a rise in temperature in a building. The most important principle of passive cooling is to first reduce all potential heat sources, especially solar gains and internal heat gains. If the temperature rises beyond the comfortable level, the excess heat can be passively removed via ventilation if the temperature outside is sufficiently lower than on the inside. Specific planning recommenddations can be found in the Summer Comfort Guide, which was published within the framework of the EU-funded outPHit project. This free planning aid assists in the identification of effective passive cooling techniques as well as in the analysis of potential risks for summer comfort in buildings.

Stress test for increased resilience

The actual summer temperature in an inhabited building is sensitive to several influencing factors. In particular, the weather (some summers are warmer than others), the climate (warming up of the climate in general has been predicted), and occupant behaviour (especially window ventilation during cool nights and use of shading elements) can all contribute. A "stress test" of the building design provides valuable feedback and a better understanding of the risk factors for overheating and can thus lead to more robust and more resilient designs. Starting with version 10.0 such a stress test is integrated into the PHPP planning tool: the tool shows the calculated frequency of overheating for various scenarios already during the planning process.



Stress test for summer comfort: the PHPP planning tool shows the frequency of overheating that would occur in various scenarios. Plans can be adjusted accordingly.
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Climate-friendly active cooling in Passive House buildings

If it becomes apparent during the planning process that a building (or individual rooms) cannot be kept cool reliably using passive cooling techniques alone, then active cooling comes into play. Due to the high level of energy efficiency in Passive House buildings, the energy demand and cooling loads are so low that active cooling can be achieved in a simple and climate-friendly way. A single split-unit air conditioner is sufficient for a detached house. The months in which active cooling is required generally coincide well with the availability of renewable solar energy. This means that the additional energy requirements can usually be met easily and efficiently with sustainable resources.

outPHit
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