

MWH

INDOOR  
SYSTEMS

## HPL® Hybrid ceiling module

Interior comfort /  
Made to measure











The **HPL® hybrid ceiling module from MWH** guarantees thermal and acoustic comfort in every office space, as it brings together all of the necessary system functions in a simple manner. Depending on the hydraulic connection to the cooling and heating water network as well as the choice of control strategy, the HPL® hybrid ceiling module acts as a thermo-active self-regulating component system for the room. It is equally suited as a high-performance cooling ceiling system with a high proportion of radiation for workplaces with an elevated thermal load.

Due to the efficient usage of the principle of a thermo-active component system and a high specific output, energy savings are guaranteed with high media temperatures in cooling mode. This promotes the adoption and use of alternative energy sources (including geothermal energy, cooling towers and seawater).

### **A sense of well-being work**

The HPL® hybrid ceiling module ensures thermal and acoustic comfort in the office - in both low-tech and high-tech rooms built to a high standard.

Rooms with a visible concrete ceiling are also ideally suited to this solution, for example, commercial and retail spaces, educational institutions, industrial premises and public buildings.









### **Thermo-active energy management**

Thermo-active means including the building mass in the building's energy management. This lends the building thermally dynamic behaviour, which conflicts with the static behaviour where the full thermal load must be dissipated during working hours. In rooms with dynamic behaviour, the thermal load is also dissipated outside of working hours.

The load is thus dissipated throughout the entire day and night cycle, as the generated heat is only partially dissipated during the day – the remaining heat is stored in the concrete ceiling. During the night, this heat is once again drained from the concrete so that the “concrete heat store” can once more optimally absorb the heat generated the next day.



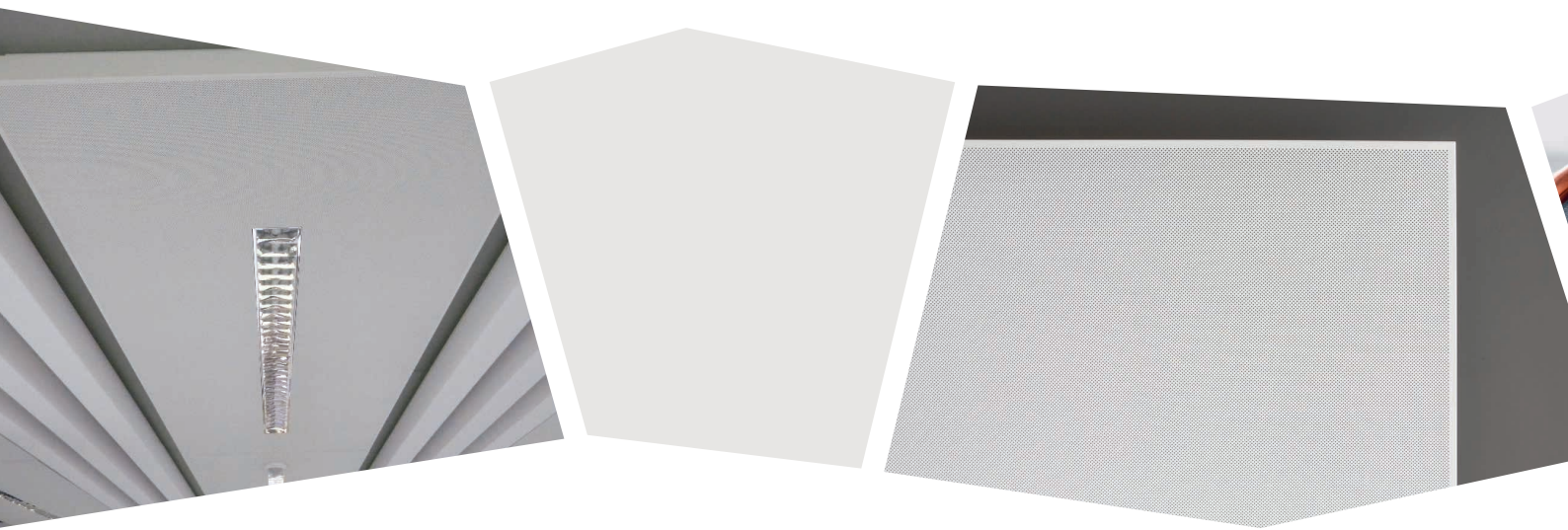




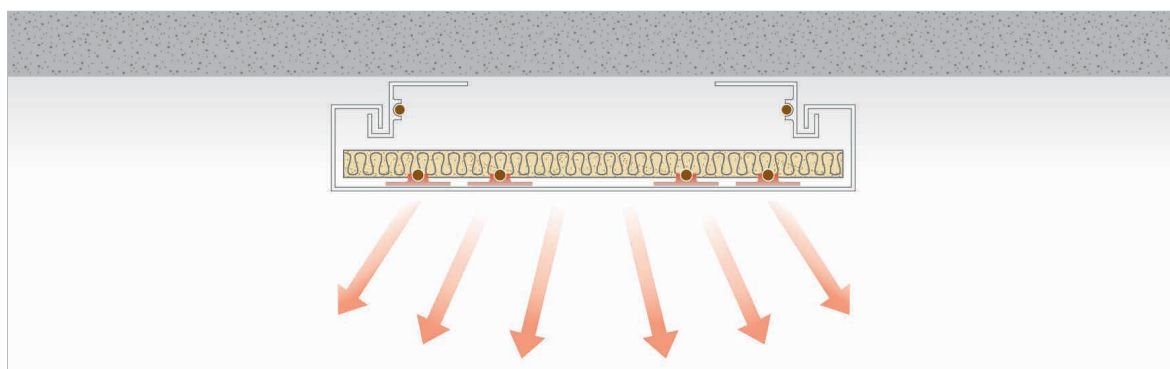








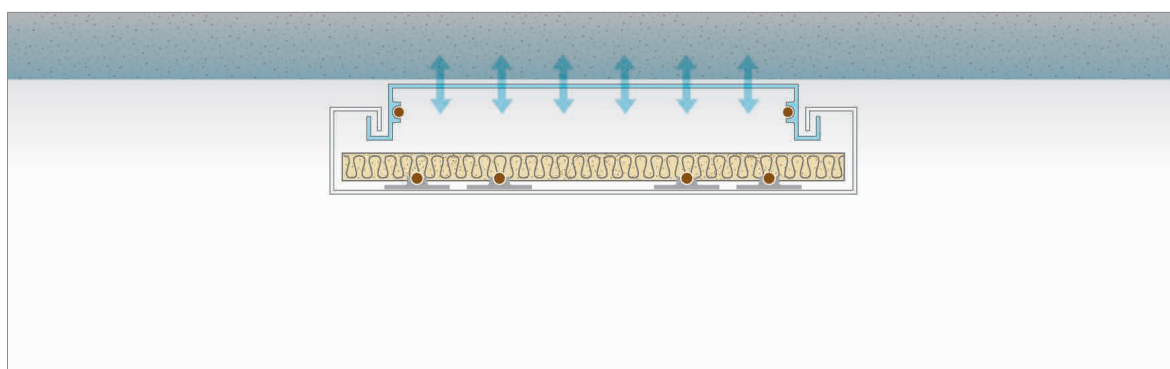
### An overview of the system functions



#### No. 1: Heating

The fast-response radiation surface that faces the room at an optimal angle ensures thermal comfort even with low heating-

water temperatures. Static heating at windows can normally be dispensed with (U-value < 1.2 W/m<sup>2</sup> K).

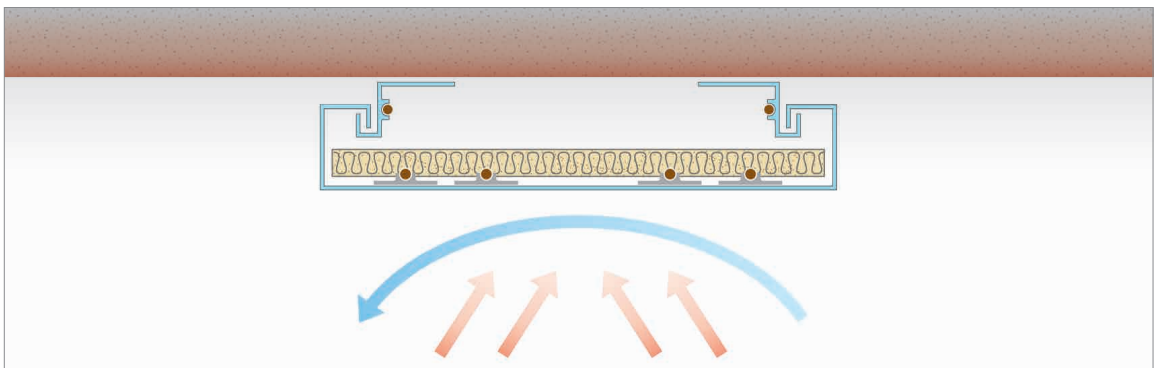


#### No. 2: Thermo-active concrete ceiling

An energy-efficient cooling water-assisted night cooling function (free cooling) thermally conditions the concrete ceiling

and ensures that thermal loads can be dissipated during the day based on the principle of the thermo-active component system.

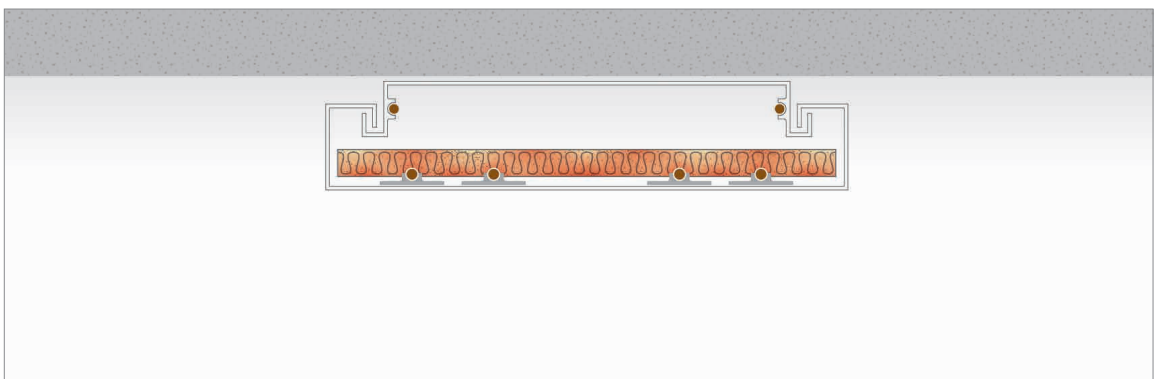




**No. 3: Cooling**

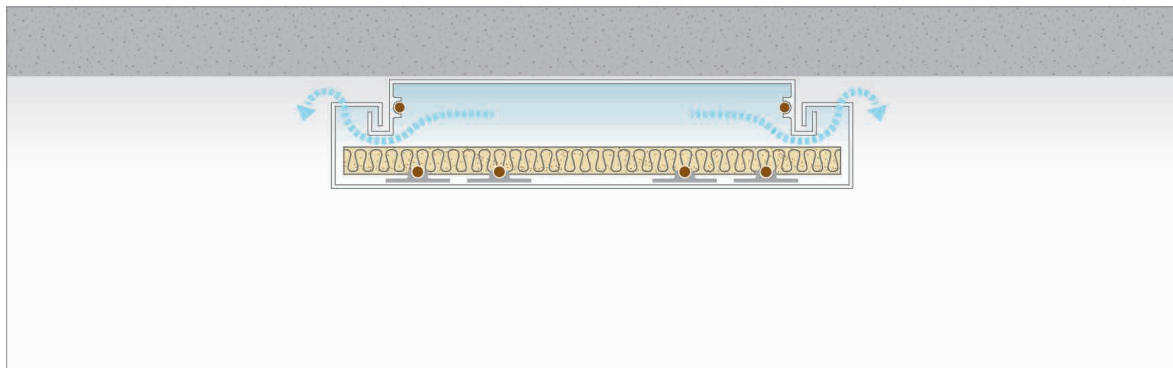
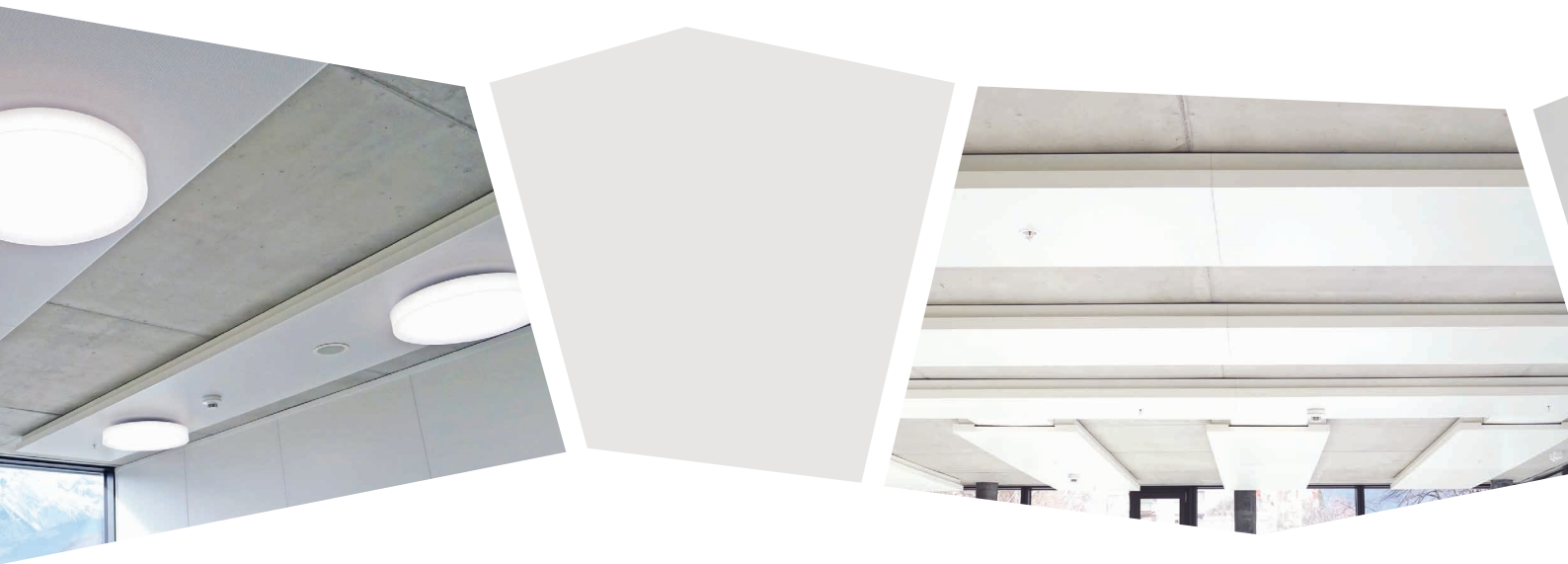
If the thermal load in the room is high and the thermo-active concrete ceiling is no longer able to maintain the room temperature at a comfortable level, the ceiling

module can also be supplied with cooling water during the day. Even high loads can be handled with this additive cooling function.



**No. 4: Sound absorption**

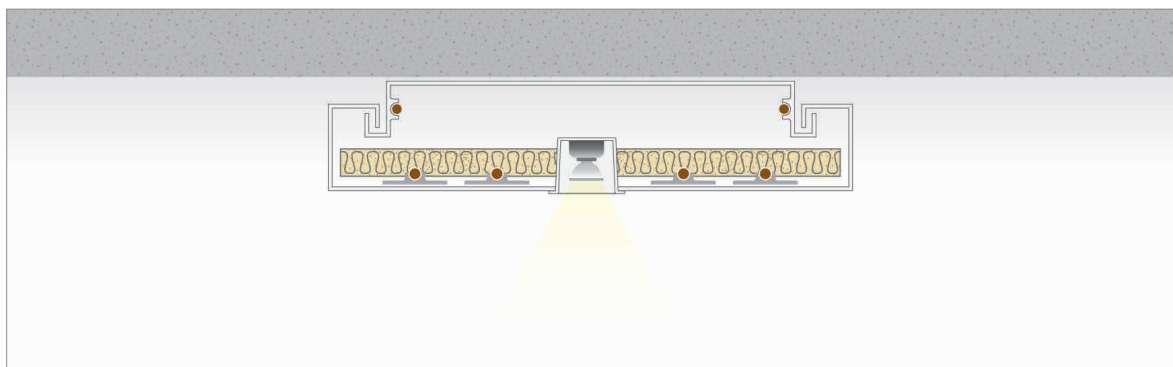
The large-scale horizontal layout of sound absorption surfaces guarantees the correct reverberation time for the space's use as an office.



**No. 5: With additional ventilation**

The hybrid ceiling module can be combined with all established office ventilation systems. With the addition of function number 5, the module integrates the mixed air function in a sophisticated

manner in terms of aesthetics and thermal comfort. Air flow in the room is designed to ensure absolutely draught-free air discharge (within the SIA limit values) at all times with a high level of ventilation efficiency.

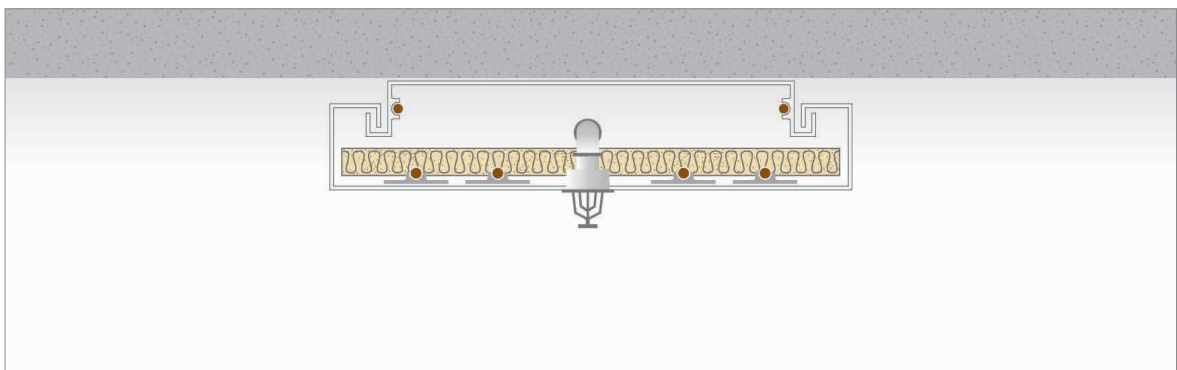
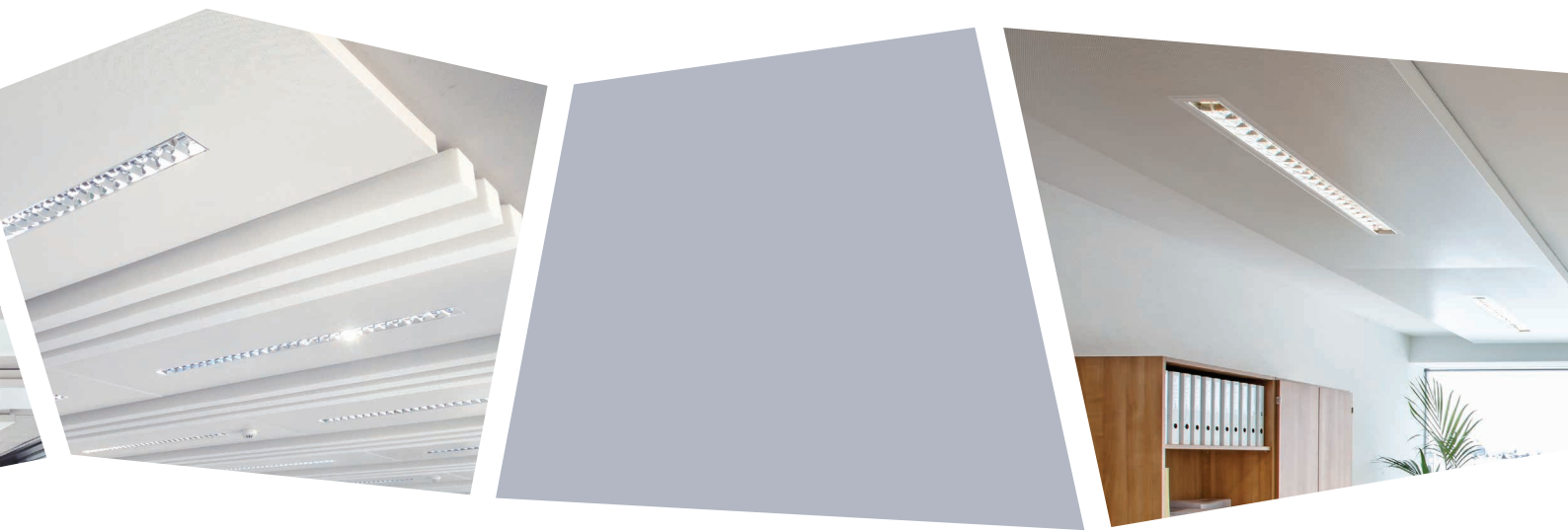


**No. 6: With additional lighting**

Direct lighting can be integrated into the system upon request. There are several lighting variants

to choose from, so that even demanding tasks can be solved and implemented.

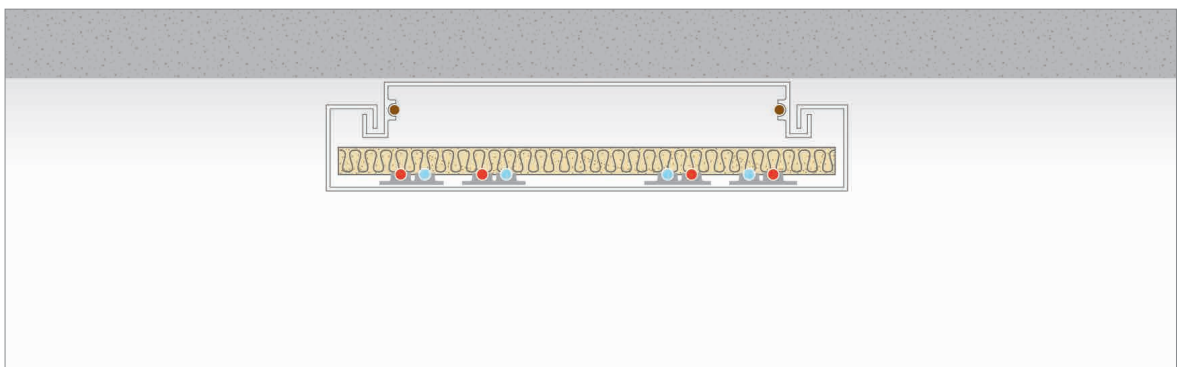




**No. 7: With an additional sprinkler**

The ceiling module can be installed with a sprinkler system. In light of the profile and

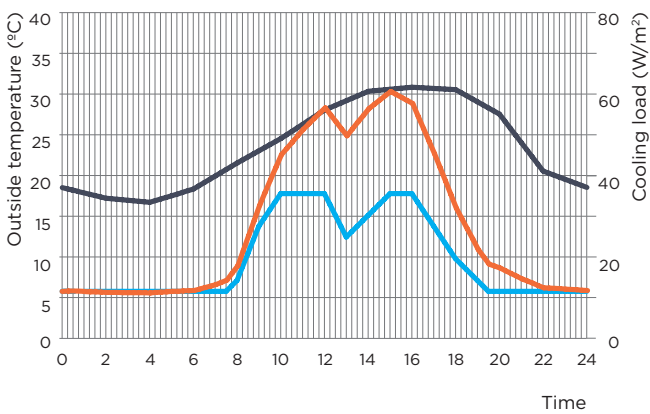
the connecting bends required for the sprinkler heads, the ceiling height must be increased slightly.



**No. 8: Dual circuit**

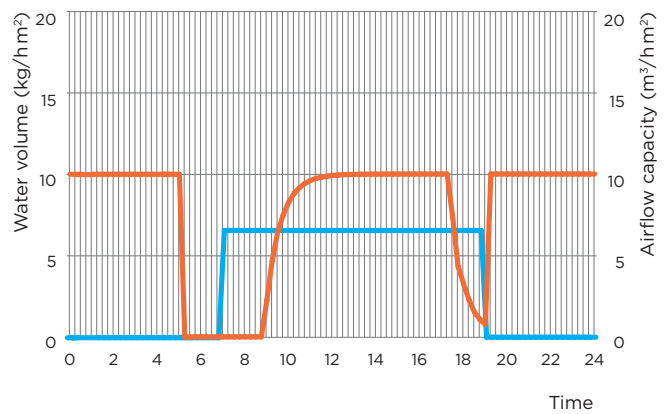
# Performance characteristics – an example of a dynamic simulation

### Cooling load / outside temperature progression



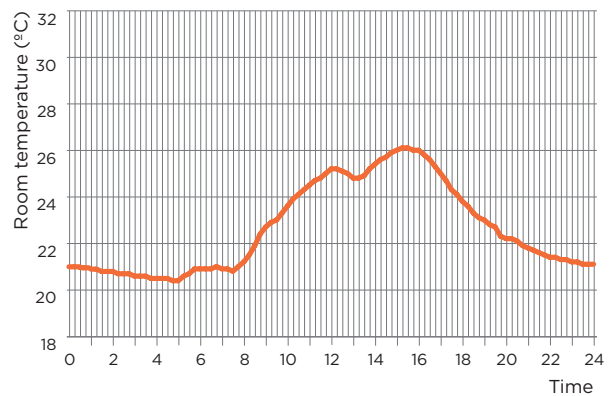
- Total cooling load
- Outside temperature
- Internal cooling load

### Water volume / airflow capacity



- Water volume
- Airflow capacity

### Room temperature progression



- Room temperature

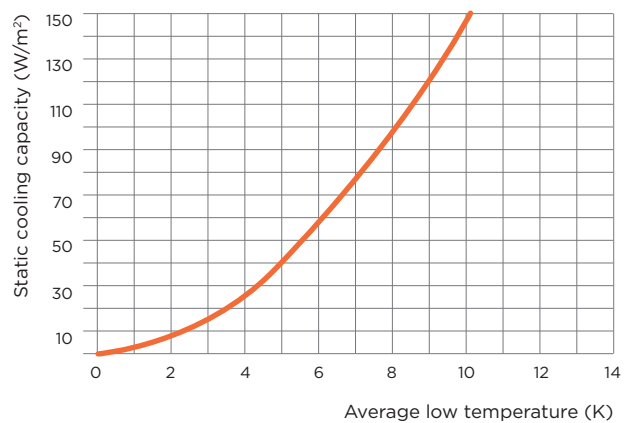




## Design

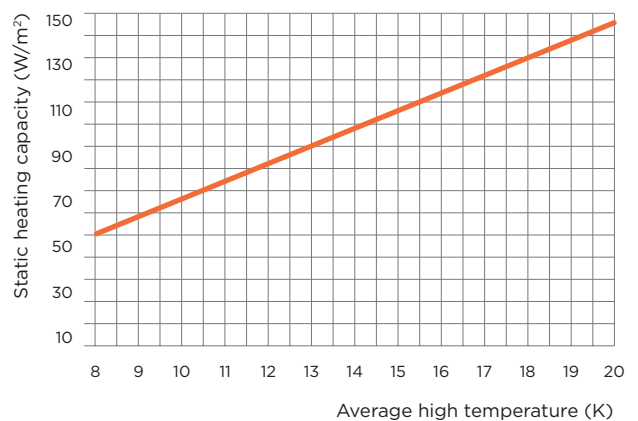
The HPL® hybrid ceiling module is designed using dynamic simulations so that the temperature profile can be assessed according to the respective parameters over a 24-hour period. The simulation is carried out in a quasi-stationary state, i.e. the start values are the same as the end values for the 24-hour sequence. This type of simulation provides information about the thermal behaviour over a prolonged steady period. This achieves the necessary design reliability, as the amount of heat supplied is equal to the amount of heat dissipated and the room temperature no longer builds up.

## HPL® static cooling capacity



— Static cooling capacity

## HPL® static heating capacity



— Static heating capacity



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