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1 *Comfortable air conditioning and effective indoor air dehumidification using the Chilled Water Wall, in this case placed in an open-plan office in conjunction with a green wall.*
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COOLING AND DEHUMIDIFYING INDOOR ENVIRONMENTS USING THE CHILLED WATER WALL

The Chilled Water Wall combines the advantages of radiant cooling systems and effective indoor air dehumidification in a single system. Both indoor spaces and individual zones are conditioned without users experiencing negative effects (such as draught or noise emitted by ventilation fans), and the limiting factors of conventional radiant cooling systems are intelligently avoided.

Chilled Water Wall (CWW) applications

In contemporary open-plan offices, there are different ways in which the CWW contributes to enhancing performance and creating a healthy indoor climate. Besides providing air conditioning, it also removes pollutants from the indoor air. Since most air contaminants and dust particles bind to the water molecules, the CWW also offers an effective means of filtering these out of the air and removing them together with the fluid, creating a natural air cleaning effect. Visually and aurally, the flowing stream of water has a soothing effect. Due to the great variety of individual applications there is considerable freedom of design. At the same time, there is clear evidence that this multi-functional space element enjoys a high level of user acceptance. In view of all this, the Chilled Water Wall is ideally suited for use in all indoor spaces where the occupants' focus is on health, well-being and efficiency.

Air conditioning of building zones

The option of conditioning defined building zones is another benefit associated with the use of the CWW. It is possible to condition specific zones within a space, deliberately using the effect of radiant cooling. This option will tap considerable energy saving

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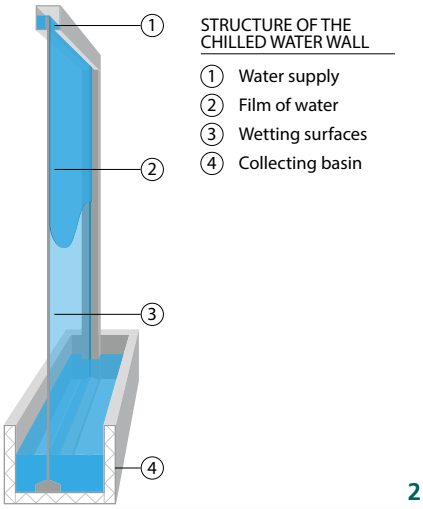

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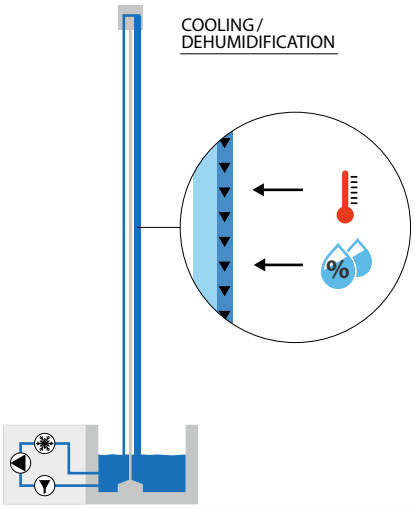

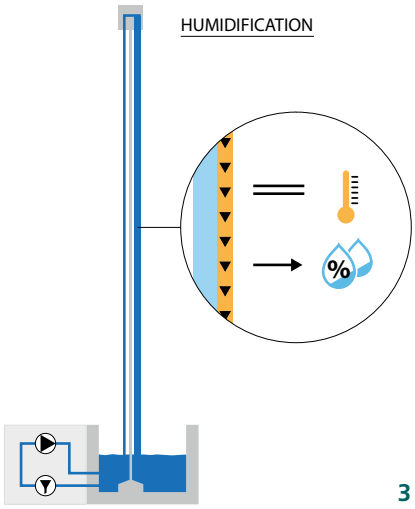

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potentials e.g. in production facilities or entrance halls with high ceilings, as only those zones will be conditioned where occupants are present. In buildings that are not equipped with air conditioning systems, a local climate can be created around the CWW, which users will perceive as refreshing during the summer heat. The pleasant experience of a welcome refreshment may also increase the attractiveness of shops, fitness centres and other recreational facilities.

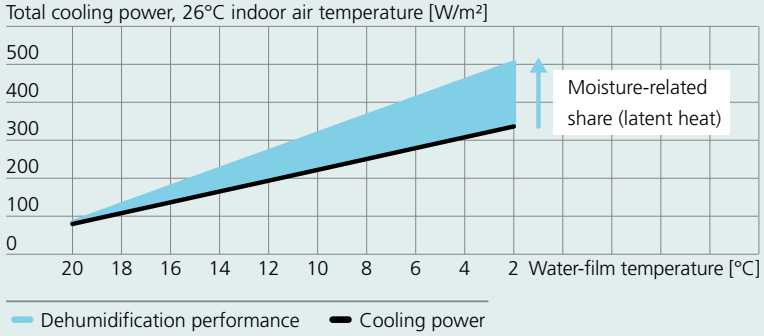
Working principle of the Chilled Water Wall

In a closed system, water flows across a vertical wall component placed inside the room, forming a liquid film on the component's surface. Without cooling, the water will evaporate and humidify the indoor air. In the winter months, this will significantly contribute to improving comfort in dry indoor spaces. In summer, however, a chiller cools the water to temperatures below 10 °C. The great temperature difference between the indoor air and the water ensures efficient cooling while dehumidifying the indoor air.

If the water-film temperature remains below the dew point temperature of the indoor air, the indoor air humidity condenses at the water film and is discharged into the collecting basin. Excess water flows off through an overrun and can be collected for further use, if required.

Advantages over other systems

Conventional air conditioners circulate cold and dry air. Though this type of air-based air conditioning is widely used, it is often criticized as being noisy and uncomfortable. As alternative solutions, water-based cooling elements (such as large chilled ceilings) or cooling techniques with thermally activated building components have become established in the market. The advantage of these systems lies in their dual mode of action: the circulating air flow is cooled while a sink is created for the longwave radiation exchange with occupants and objects present inside the space. All this is achieved without causing noise or uncomfortable air draughts. With these systems, however, the cooling power per unit area is limited. Contrary to the CWW, they are not suited for dehumidifying the indoor air, because the surface temperature of the cooling elements must not be reduced too radically in order to prevent condensation and mould formation. The main benefit of the CWW is due to the fact that it can be operated at significantly lower temperatures without any problems. This will not only multiply the cooling power but also allow for effective dehumidification. Due to the long-wave radiation exchange with the chilled surface of the CWW and the reduced indoor air humidity, air temperatures inside the space will be perceived as comfortable even if they exceed the usual comfort temperature by several degrees. In this way, the Chilled Water Wall ensures efficient air conditioning of buildings and saves energy, too.



Benefits in a nutshell

- Radiant cooling in combination with indoor air dehumidification
- Higher cooling power per unit area compared to conventional radiant cooling systems
- Option of humidifying too dry indoor air
- Superior thermal comfort and improved indoor air quality
- Option of effective zonal air conditioning using radiant cooling

2 *Structure and functional principle of the Chilled Water Wall.*

3 *Use of cooled water: Effective cooling and dehumidification of the indoor air. Without water cooling: Indoor air humidification in winter to improve dry air in offices.*