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Ursapharm Saarbrücken, Germany

Heating and cooling ceiling systems building report, warehouses and high-bay warehouses

Heating and cooling at a constant temperature

Indoor climate specialist Zehnder delivers efficient heating and cooling technology for Ursapharm pharmaceutical logistics centre

Zehnder radiant ceiling panels are operated in winter operation with a maximum flow temperature of 38°C and 30°C return temperature, which ensures optimum energy efficiency. In summer operation, the flow temperature is 16 °C and the return temperature is 18 °C. A dew point monitor was also installed for the cooling mode.

The radiant ceiling panels make even heat distribution possible, so that no heat accumulation occurs under the hall ceiling. In the event of a fire, this ensures better smoke extraction. This meant that there was no need to install an expensive and complex fire alarm system in the warehouses. Instead, only a few conventional smoke detectors were needed.

Lahr, November 2020. If the temperature deviation from the setpoint value in a high-bay warehouse is to be a maximum of ±1 °C on an annual average and the relative humidity must also be within a range of between 20 and 65%, then the technical building equipment must meet high requirements. One solution to comply with these kinds of project requirements can be seen with the expansion of the pharmaceutical logistics area of Ursapharm Arzneimittel GmbH, with its headquarters in Saarbrücken. In this case, the even temperature distribution required in the hall was achieved through extensive sensor technology and the use of Zehnder radiant ceiling panels.

Ursapharm Arzneimittel GmbH is one of the world's leading manufacturers of ophthalmic products. Today, the company employs more than 650 people. Expanding the logistics area became necessary in 2016 for the steadily growing business operations of this pharmaceutical company, resulting in the construction of a new high-bay warehouse and an adjacent block warehouse with a total area of 5,900 m². Both halls were completed in accordance with the EnEV standard in the autumn of 2018. There were high requirements for the planning and realisation of the new warehouses, as Dipl. Ing. André Sauerbrey, Head of Operational Management at Ursapharm, reports: "The temperature conditions are supposed to be the same as in production."

In addition, during the planning phase, Ursapharm came to the conclusion that the end product should also be stored there as well as the folding boxes, labels and package inserts. Ursapharm set itself the challenge that the maximum temperature deviation between the temperature loggers in the entire hall in the high-bay warehouse may only be a maximum of ±1 °C throughout the year. "For example, when it's warm in the summer, our eye ointment would liquefy if there were no cooling and there would no longer be any guarantee that the active ingredient would work as it should. That's why the best possible storage temperature is carefully

The new construction of a high-bay warehouse and an adjacent block warehouse with a total area of 5,900 m² was intended to optimise logistics processes. Both halls were completed according to the EnEV standard in the autumn of 2018.

The temperatures have to be evenly distributed throughout the hall. This is ensured through modern radiant ceiling panels from Zehnder combined with intelligent sensor technology.

The radiant ceiling panels operate completely automatically thanks to control system technology. The switching precision between the cooling and heating functions is controlled by the room temperature using a temperature sensor and in consideration of the current weather forecast.

A total of 1,200 linear metres of radiant ceiling panels were installed. Using the special suspension system from Zehnder, the radiant panel system could be installed on the ceiling with millimetre precision.

Zehnder radiant ceiling panels have water flowing through them and only emit the infrared radiation temperatures once they come into contact with an object or body. What's more, they do not have to heat or cool the entire room air to do so. This creates a comfortable, healthy and very efficient indoor climate.

Over the entire room height of seven metres – where measuring points were installed on three levels – no temperature deviation of more than 1 °C occurred in the Ursapharm storage area. This complies with the strict requirements of the GMP and FDA.

tested in advance," explains Nadine Ritz, Operational Management Assistant at Ursapharm.

Planning according to standards

Pharmaceutical companies have to meet strict testing criteria and standards, primarily Good Manufacturing Practice (GMP), which refers to quality assurance practices for pharmaceutical production processes and environments. Ursapharm is also FDA-certified and permitted to sell in the American market. For this reason, it was important for the company to have heating and cooling technology that keeps the temperature precise and constant while also distributing it evenly. In addition, the heating and cooling system needed to be energy efficient, maintenance free and user friendly. Together with the planner Heiner Stier from the company ITG Braun Ingenieurbüro für technische Gebäudeausrüstung GmbH from St. Wendel, Germany, which also has a location in Saarbrücken, Ursapharm decided on the 'Zehnder ZIP' radiant ceiling panels from Zehnder.

Accurate installation to the millimetre

"Last but not least, our partner for the heating and cooling technology also had to demonstrate a high degree of flexibility, as the installation area and the paths were already predefined in the high-bay warehouse. For example, the project manager responsible for Zehnder, Mario Gaal, worked with us to develop a system that made heating, cooling and LED lighting possible in the specified installation paths," says André Sauerbrey. The average installation height of the radiant ceiling panels is approx. 8 m, slightly suspended at a hall height of 9 m. A total of 1,200 running metres of radiant ceiling panels were installed over an area of 6,000 m². Using the suspension system from Zehnder, the radiant panel system could be installed on the ceiling with millimetre precision.

FACTS AT A GLANCE	
Hall footprints:	High-bay warehouse: 4,600 m²
	Block warehouse: 1,300 m²
Product:	Zehnder ZIP radiant ceiling panels (custom-made with LED strips)
Overall length:	1,200 running metres
Installation height:	8 m
Heating/cooling operating temperatures:	38/30/22.5 °C / 16/18/22.5 °C (flow/return/room temp.)
Thermal output / cooling capacity:	approx. 330 kW / approx. 148 kW

The smoke and heat extraction systems (RWAs) for fire protection were planned and installed in such a way that they do not interfere with the radiant ceiling panels. On-site integration of the LED lighting presented a challenge in terms of planning. In the end, however, it was possible to install the LED high-bay lights in the appropriate dimensions of 30 cm x 30 cm in such a way that the bottom edges of the radiant panel system and those of the lights were flush.

Exact temperature and humidity levels

The radiant ceiling panels made it possible to not only achieve constant temperature distribution throughout the entire hall at all levels, but also comply with the high temperature stability required. This was then confirmed using extensive measurement technology: “We installed a total of 61 data loggers for temperature and humidity measurement at various heights throughout the high-bay warehouse. During the two-year measurement period, there were no deviations from the optimum temperature of 22.5 °C that were higher than ±1 °C in any respect,” Nadine Ritz proudly reports. “The relative humidity specifications were also more than met. Here, we are constantly between 45 and 60%, which is well above the limit of 20 to 65% required by the US authorities and pharmaceutical agencies,” adds the management assistant. After two years of intensive measurements, 50 of these data loggers were removed, and the remainder are now being used to monitor the radiant ceiling panel operations. The switching precision between the cooling and heating functions is controlled via the room temperature, taking into account the current weather forecast.

Reduced costs for fire detection

“Another plus point, of course, is the pleasant radiant heat from the radiant ceiling panels without any draughts whatsoever,” Sauerbrey continues. The heating is based on radiation, which only releases its heat once it comes into contact with an object or a body, so that the entire room air does not have to be heated or cooled. Sauerbrey goes on to add: “That means that in the case of heating, the room air temperature can be kept up to 3 K lower, or up to 3 K higher in the case of cooling, as compared to an air heater or other heating system that works with convection. That guarantees considerable energy savings. Other advantages include the even heat distribution over the entire height of the building and the avoidance of dust swirls.” But there is yet another positive effect brought about by the even heat distribution from the radiant ceiling panels, according to Sauerbrey: “…because no heat accumulation can occur under the hall ceiling. This meant that there was no need for an elaborate fire alarm system in the warehouses, only the installation of conventional smoke detectors. This kind of fire alarm system would otherwise have cost us two or three times as much, not to mention the high maintenance costs. So it’s fair to say that the radiant ceiling panels from Zehnder have considerably reduced our costs here,” says Sauerbrey, visibly satisfied.

Heating/cooling modes

In the course of constructing the new building, Ursapharm also renovated its old heating system. Today, a gas condensing boiler supplies heat to the new buildings, warehouse and block warehouse, as well as to the existing buildings, which contain the offices. Cooling is provided by a compression cooling unit. The radiant ceiling panels are operated in winter operation at a maximum flow temperature of 38 °C and 30 °C return temperature. “This ensures optimum energy efficiency. And this is also reflected in the consumption figures: The energy costs are 40% lower than those of a conventional heating system,” says planner Heiner Stier proudly. In summer operation, the flow temperature is 16 °C and the return temperature is 18 °C. A dew point monitor was also installed for the cooling mode.

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