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The 3.500 m² Blutzentrale (blood centre) Linz, Austria

HYGROMATIK
WE HUMIDIFY THE AIR

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High Pressure Nozzles Replace Steam Humidifiers

Changeover at the Blutzentrale (blood centre) Linz to new Air Humidifying Systems

In the Blutzentrale Linz, the Upper Austrian Red Cross operates cleanrooms with classes A to D over an area of 3 500 m². Here, stem cells and tissues are produced from organs that are subsequently reintroduced into the body. As strict limits for climatic data and a minimum level of 50% humidity must be maintained in these rooms, the current, uneconomical steam humidification systems in the HVAC control room were converted to efficient high pressure nozzle solutions from HygroMatik.

Air quality, temperature and humidity play an important role in the 3 500 m² large production facility of the Bluten-

trale Linz/Austria. Due to the highly sensitive nature of the activities, both the highest facility-specific and hygiene



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standards are legally stipulated for these rooms. For example, Class B cleanrooms, serving as the back-

ground environment for the aseptic preparation of medical devices of cleanroom class A, must demonstrate a maxi-



View into the humidification section equipped



Technique room in the Blutzentrale (blood centre) Linz with two HygroMatik HDS systems

imum of 29 particles of size 5.0 μm per 1 m^3 in a non-operating state. For comparison: In a normal office, there are on average 100 000 particles of size 5.0 μm per 1 m^3 .

Previously, the incoming air for the cleanrooms in the Blutzentrale Linz was humidified with 11 isothermal steam humidification systems. In this way, a relative humidity of 45 % was achieved. These were incorporated into eight HVAC facilities with a maximum air quantity of 135 000 m^3/h . The maximum output of the eleven steam humidification systems was 780 kg/h . These systems have demonstrated themselves to be disadvantageous and uneconomical due to a number of reasons, for example, high costs, high service expenses and hygiene aspects. The entire energy costs amounted to 430 000 EUR per year, of which around 224 000 EUR were apportionable to climate control. Additionally, 7 500 EUR

were on the books for servicing. For this reason, an alternative to the previous steam humidification was sought.

Reducing energy and operating expenses

Engineer Ewald Cerny of the engineering company EHL-Technik Krems/Austria, which specialises in electrical engineering and HVACR, as well as planning of cleanrooms in the pharmaceutical area, was commissioned with the development of alternative solutions for the so far unsatisfactory condition of the climate control and in particular, the air humidification. At the same time, the strict legal framework of the ÖNorm H6020 "Ventilation and air conditioning plants for locations of medical use - Design, construction, operation, maintenance, technical and hygienic inspection" (2007) in particular, had to be adhered to. The ÖNorm

H6020 is equivalent to the German DIN6022; however, it is clearly formulated in relation to room climate and humidity, and is therefore, considerably stricter. Up until its revision in 2007, the ÖNorm H6020 only permitted the use of isothermal humidification systems in the hospital sector. With the revision of the standard, the possibility of using alternative systems was created, if its microbiological-hygienic uncritical equivalency to steam humidification can be determined through an assessment. Thus, the use of an energy-efficient adiabate humidification system could be considered. Furthermore, the engineering company EHL-Technik developed a water treatment system (without chemical additives), which together with the high pressure nozzle humidification system (HDS) from HygroMatik forms a complete system in accordance with the regulations and standards. After com-

pletion of an 18-month test phase, which was supervised by Dr. Milo Halabi as a legally certified assessor for hospital hygiene, the Upper Austrian authorities were convinced of the high hygiene standard of the new adiabate humidification system. At the same time, the equivalency to isothermal systems was also attested as required by the ÖNORM H6020.

From the test to the changeover

During the test phase, a second adiabate system from a different manufacturer was tested in parallel for comparison with the HygroMatik HDS-system over an 18-month period. The evaluation criteria compared the systems on the following points: installation, service, contact and communication with the manufacturer as well as the service life and performance parameters. The



View into one of the labs at the Blutzentrale (blood centre) Linz



Head of clinic Dr. Christian Gabriel, Blutzentrale (blood centre) Linz and Hermann Maier, HygroMatik sales Austria / North Italy in front of the entrance of the Blutzentrale (blood centre) Linz (all copies HygroMatik)

results documented the superiority of the HygroMatik solution:

- The fitting of the HDS-system (System A) was easier and considerably faster than that of System B from the competition.
- According to the operator, the first signs of wear and tear were already apparent in System B after 18 months. In contrast, the HDS-system from HygroMatik GmbH continued to function faultlessly.
- Furthermore, the HDS-system was convincing with a short absorption distance, low operating costs and almost “dry humidification”. This means an almost dry humidification chamber in the HVAC system during humidification. Mr Cerny, who coined the term “dry humidification”, confirmed: “There is no condensation on the duct walls – except for low level of water loss directly at the aerosol separator, which is immediately channelled off”. This ideal

condition is achieved through the use of high precision atomiser nozzles and their optimum positioning in the air-stream.

- During operation of the HDS systems there was additional free cooling of the incoming air. Thus, the air-conditioning system considerably reduced the energy expenditure for air cooling (performance of the water cooler).

To date, all 11 existing steam humidifiers have been converted to eight HygroMatik HDS-systems in the Blutzentrale Linz. The operating cost savings associated with this amount to 86 331 EUR per year. Additionally, two further HVAC facilities have been equipped with HDS-systems, so that the incoming air can be humidified with a total humidification power of 1 100 kg/h or 158 000m³/h.

Furthermore, the Blutzentrale

is considering adiabate cooling of the outlet air. The target is to use the adiabate cooling effect to the fullest extent also during the summer months, in order to reduce further energy consumption and operating costs.

Summary

The complete system described here was installed for the first time in Class A to D clean-room areas with administrative approval, thereby also allowing its use within the hospital sector. By coupling the systems of water treatment and high pressure nozzle humidification, a quality was achieved that corresponded, on the one hand, with the legal requirements, and, on the other hand, this could be repeatedly demonstrated in the framework of on-going hygienic investigations.

The cost effectiveness of the HygroMatik HDS humidification systems

Operating costs for air humidification – previous state:

Energy costs for isothermic air humidification: 96 267 EUR p.a.
Maintenance: 7 500 EUR p.a.

Operating costs for air humidification – new state:

Energy costs for adiabate air humidification: 2 524 EUR p.a.
Energy costs for pre-warming the air: 13 512 EUR p.a.
Maintenance costs: 1 400 EUR p.a.

Savings in operating costs by using the HygroMatik

High pressure nozzle system: 86 331 EUR p.a.

Total investment costs: 146 000 EUR

Amortisation: 1.69 years