Comfortable, energy-saving air humidity at the workplace

Air in workplaces must be neither too dry nor too humid. Correct indoor air humidity settings always pay off, because a great deal of energy is required to humidify the air.

Action

Determine the actual air humidity in the room and select the optimal humidification setting for the supply air on the ventilation system.

Requirement

You have a ventilation system that humidifies the supply air and ensures a pleasant indoor climate.

What to do

Check the relative indoor air humidity on a cool and dry winter day when the outside temperature is below 4 °C. This will enable you to choose the optimum setting values for the supply air. The ventilation system must be in operation when you do this.

- Measure the air humidity in the rooms that you ventilate.
- If the relative air humidity (RH) is significantly above 35%, check the temperature and humidity in the exhaust air duct. If the relative air humidity is also too high here, adjust the humidification values on the ventilation unit so that the rooms are controlled to a relative air humidity of 30%.
- Check the relative air humidity in your rooms on the next day, and also one week after the optimisation. Correct the value on the ventilation unit as necessary.

Costs – effort

- A simple uncalibrated hygrometer costs between CHF 30 and CHF 40. A calibrated hygrometer is available from specialist trade outlets at prices starting from CHF 250.
- You will require about two to four hours of labour, depending on the number of rooms and ventilation units.
- If the air is humidified by an additional 5%, the energy required for humidification will increase by 40% to 80%.

Please note

- In physiological terms, an optimum relative air humidity value in winter is 30% or more. The value may also fall below this level for short periods.
- In cases where active humidification is unavoidable, the value should not exceed 45% RH. Also, please note the SIA recommendations.

Additional explanations

Example: conference centre

To take one example: optimisation of air humidity is particularly effective in a conference centre. If the supply air for the plenary hall is humidified at a constant value of 40% RH, a reduction to 30% RH can reduce the annual energy consumption for humidification by 42'000 kWh. This is because considerable volumes of air are humidified – in this example, the ventilation system conveys 50'000 m^3 of air per hour, and operates for 800 hours each year.

Use humidification for cooling

Consult a ventilation specialist to check whether adiabatic cooling by evaporation is possible and suitable with the existing humidification system. In this case, the supply air can be cooled down by several degrees Celsius with the humidification equipment, instead of using a mechanical cooler. This "evaporative cooling" is particularly suitable in the transition period, when the required cooling effect can be achieved with slightly increased air humidity.

Dry air at very low temperatures

If some ventilated areas are very dry during winter when outside temperatures are below 0 °C, you can manage to improve this by reducing the flow of supply air. Monitor the room air humidity constantly, and reduce the outdoor air flow by up to 50%. It may be necessary to adapt the control (with a second control circuit) for this purpose. Discuss the situation with your ventilation specialist.

Do you have individual rooms with high indoor air humidity requirements?

If there is a need for high indoor air humidity (e.g. 50% RH) in two or three of your rooms, it is not worth increasing the humidification of the whole supply air via the central ventilation unit.

Instead, increase the air humidity in these rooms with plants (e.g. papyrus), water features (water walls, fountains, climate fountains, etc.) or with an efficient room air humidifier (evaporator).

Swimming pools and wellness pools/spas

In swimming pools and wellness pools/spas, the air in the facility must be constantly dehumidified during opening hours to provide a pleasant climate. But at night, when there are no guests in the pool or spa, the air humidity there can be increased to save energy.

The air humidity can be raised until condensation water forms on the component with the worst thermal behaviour (glass surfaces, corners, or poorly insulated steel beams). If you discover condensation water on these building components, the air humidity is too high and the set point must be lowered. Experience shows that in buildings where the "worst" building component has a U-value of 1,2 W/m^2K, the air humidity can be increased to as much as 65% at night without condensation forming.

Additional information

- Operational optimisation for energy efficiency – operating buildings more efficiently: reference book, 2021
- Building technology – integral system planning, reference book, 2022
- Energy efficiency in fitness and wellness facilities: the easy way to reduce your energy costs
  Information sheet 05: Ventilation
- Standard conditions of use for energy and building technology, Fact sheet 2024, SIA, 2015
- Air humidification
  Fact sheet for specialists in the ventilation industry, architecture and building services, SwissEnergy, 2016

SwissEnergy
Federal Office of Energy (SFOE)
Pulverstrasse 13
CH-3063 Ittigen
Postal address: CH-3003 Bern

Infoline 0848 444 444
infoline.energieschweiz.ch
energieschweiz.ch
energieschweiz@bfe.admin.ch
twitter.com/energieschweiz

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