The right airflow improves the quality of the room air

Complaints about room air – such as “it’s muggy”, “it’s too dry” or “there’s a draught” – are signs that the airflow is not adjusted correctly and must be checked.

Action

Adapt the airflow for the ventilation system to match the actual requirements in the rooms.

Requirement

It must be possible to control the airflow fan with a frequency converter, a step switch or an EC (electronically commutated) motor.

If the airflow is halved, the energy consumed by the ventilation decreases by 80 percent

What to do

1. Record the initial situation

- Determine the airflow setting (supply and exhaust air). These values should be recorded in the commissioning record for the ventilation system. If the data is missing, a ventilation specialist can determine the volume flows.
- Note the current supply and exhaust airflows in the logbook (plant journal).

2. Measure the air quality

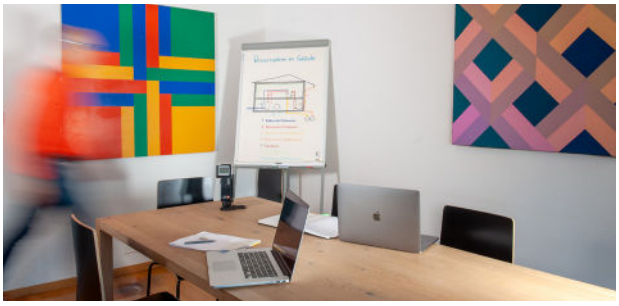
Use a data logger to determine the air quality in the room for a period of about 2 weeks (CO_2 concentration and air humidity).

3. Compare the measurement results with the default values

- Compare the measured values with the default values (see page 2) for CO_2 content and relative air humidity and adapt the airflows if necessary (see page 2).
- Coordinate the supply and exhaust airflows.

4. Note, observe and correct

- Enter the newly adjusted airflows and setting values (frequency and speed) in the logbook.



- Observe the users (are there any complaints?) and correct the settings if necessary. In case of doubt, measure the CO_2 values and the humidity again.

Costs – effort

- Your own labour (measurements, settings, updating the logbook): approx. one working day
- Air quality measurement (CO_2, air humidity): CHF 200 per measuring point

Please note!

- Depending on the room usage, peak CO_2 values may occur briefly with no need to increase the airflow permanently (e.g. in meeting rooms).
- In terms of energy efficiency, it is worth checking all rooms even if there are no complaints. It could be that too much air is being blown in without anyone noticing.
- Pay attention to additional requirements for the rooms (such as overpressure or underpressure).
- For plants with a recirculating air system, the minimum proportion of outside air may be reduced to save energy.
- On ventilation systems with old motors (belt drive), the speed can be changed by changing the size of the drive pulley.

Additional explanations

Setting the volume flow

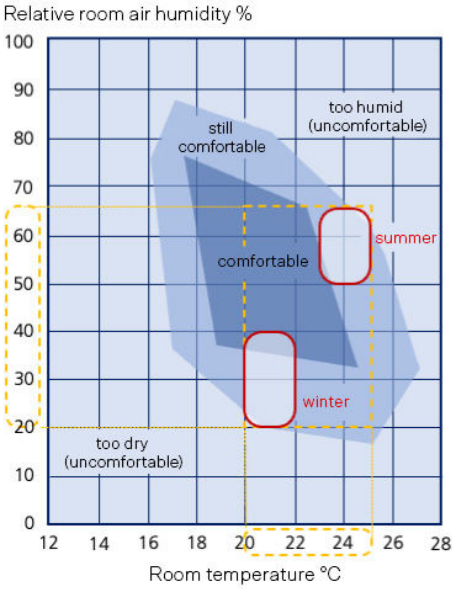
The volume flow (m^3/h) is the airflow that is fed to the room. Depending on the ventilation system, either fresh air only or fresh air with a percentage of recirculated air is blown in. The volume flow can be changed as follows:

- Change the levels on the relevant fans (e.g. levels 1 and 2)
- Adjust the speed of fans with a frequency converter (e.g. continuous control based on limit values such as CO_2 and temperature)
- Adjust the speed on fans with EC (electronically commutated) motors (using the integrated motor electronics)
- Cycle the system (switch on/off) over the operating times for an average/moderate volume flow
- Define seasonal operating times or levels

The supply and exhaust airflows must be coordinated with each other.

Temperature and relative air humidity

When assessing comfort, the relative room air humidity is an important factor as well as the temperature. To ensure that the ventilation system operates economically, both values must be adapted to outside climate conditions (see the illustration).



How to determine the default values

The theoretically required volume flow can be calculated on the basis of the number of occupants, the usage or the room type. The following table provides guidance values for the calculation:

Room type	Outside air volume flow (m^3/h/person)	Targeted CO_2 concentration (ppm)	Requirements for room air (category)
Office	36	800–1000	IDA 2 – medium
Open-plan office	36	800–1000	IDA 2 – medium
Meeting room	36	800–1000	IDA 2 – medium
Retail shop	30	800–1000	IDA 2 – medium
Restaurant	36	800–1000	IDA 2 – medium
Warehouse hall	36	1000–1400	IDA 3 – moderate
WC	—	1000–1400	IDA 3 – moderate
Changing room/ showers	—	1000–1400	IDA 3 – moderate
Classroom	25	800–1000	IDA 2 – medium

Implementation

- If the measured CO_2 values are above the default values, the airflow must be increased (to improve the air quality).
- If the measured CO_2 values are below the default values, the airflow can be reduced (to save energy).

Example of calculation: default values for outside air supply

- Office with 10 people:
  10 pers. x 36 m^3/h person = 360 m^3/h
- Set the CO_2 control to constant regulation at 1000 ppm.
- For CO_2 controllers with a hysteresis: switch the ventilation on at 1000 ppm and switch it off at 800 ppm.
- With dynamic CO_2 controllers that can map a setpoint ramp, set the frequency converter so that the airflow increases continuously from 800 ppm, and 100 percent of the airflow is delivered at 1200 ppm.

Dry air in winter

Before you set up an energy-intensive air humidifier, check whether the airflow for the room can be reduced.

Additional information

- "Room usage data for energy and building technology", SIA fact sheet 2024, www.sia.ch
- Indoor air quality (IDA value), see standard EN 13779

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11.2021