More is less: don’t cool your servers below 27 °C

Modern servers still operate reliably with a supply air temperature of 27 °C. Cooling the air down to a lower temperature with the mechanical cooling system requires unnecessary energy and increases the operating costs.

Action

Allow temperatures of up to 27 °C in the server room to cut your cooling costs by as much as 60%.

Requirement

You operate an in-house server room (a small data centre) or your own servers in your company.

What to do

- Measure the temperature in the intake airflow, in the uppermost position of the server installation. The temperature at the top of the rack is usually somewhat higher.

A: For air-cooled server rooms with their own split air conditioning unit:

- Set the split air conditioning unit so it only starts cooling the air in the intake flow at 27 °C.

B: For air-cooled server rooms that are cooled via the central cooling system:

- Set the room cooling so the air in the intake flow only starts cooling at 27 °C.

C: For water-cooled server rooms that have their own cooling system (air-water):

- Set the water circuit temperature so that cooling of the air upstream of the servers only starts at 27 °C.

Costs – outlay

- A simple factory-certified thermometer with an accuracy of ±0.1% costs between CHF 100 and CHF 150.

Please note

- The ambient temperature in the room can be up to 30 °C or more if a separation between the cold air going to the server and warm air coming from the server is present in the room. The high room temperature has no negative impact on equipment availability. Ideally, the supply air temperature is adapted to the actual demand, and is not kept at a constant temperature level.
- Targeted dehumidification of the supply air is not usually required. Ensure that the relative air humidity in the room is between 20% and 80% (also see overleaf).

Additional explanations

Increasing the temperature

According to ASHRAE[1] 2012, the industry standard, and the IT equipment manufacturers, it is possible to increase the supply air temperature upstream of the IT equipment to as much as 27 °C without problems. In this case, adhere to the requirements specified by the hardware suppliers (servers, hard disks, switches, etc.).

Pay attention to air humidity

ASHRAE also recommends a higher tolerance for humidification of the supply air in order to keep energy expenditure low. The relative humidity must not be less than 20% (static discharges) so the equipment is not damaged. However, humidification to more than 30% relative humidity is just as unnecessary as dehumidification to below 70% relative humidity. In overall terms, the accepted bandwidth for air humidity in the server room is broad (e.g. 20% – 80% relative humidity) before there is a need to condition the air.

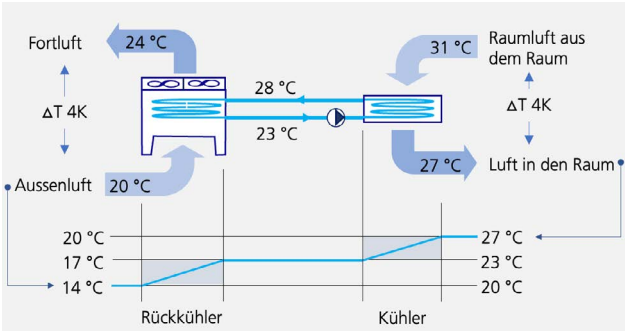
Avoid solar radiation into the server room

Protect the server room against direct solar radiation. This is because the sun introduces additional heat into the room, which then has to be removed again by the cooling system. If external windows cannot be avoided in server rooms, they therefore require good shading (blinds).

Use free cooling when outdoor temperatures are low

Server rooms need to be cooled throughout the year. This makes them particularly suitable for “free cooling”. Please note: valuable heat is removed with free cooling. If you can use this heat in the building (for heating in the transitional period), utilisation of heat makes more sense than free cooling. But if you are not able to use the heat, the server room can be cooled with free cooling.

- With air-cooled systems, you can use the cold outside air (up to 27 °C) directly as supply air.
- With water-cooled systems, the cooling water (and therefore – indirectly – the server room) is cooled by the outside air, without a mechanical cooler. This indirect free cooling operates with two heat exchangers, each of which requires a temperature difference of 3 to 4 K in order to operate cost-effectively. This means that outdoor temperatures of less than 20 °C are necessary for indirect free cooling (see image).



Additional information

- Less electricity and more efficiency in server rooms and data centres: Information platform for server rooms and data centres, SwissEnergy
- Promoting efficient data centres: the PUEDA+ funding programme
- Site analysis for your company: The energy check for server rooms and data centres
- Efficient data centres: list of actions

[1] The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) publishes standards and guidelines for air conditioning technology, including ASHRAE TC 9.9 – Data Center Power Equipment Thermal Guidelines and Best Practises – regarded in the industry as the standard reference for air conditioning in data centres.

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