

Cooling water treatment acc. to VDI 6044, ÖNORM H 5195 and SWKI BT 102-01

Technical information



Why cooling water treatment is becoming increasingly important

Cooling water treatment according to VDI 6044, ÖNORM H 5195-1 and SWKI BT 102-01

Especially in cooling water systems, there are new requirements due to complex system components and a variety of different materials. Mixed installations and contamination lead to operational disruptions, efficiency losses and repair work on cold and cooling water circuits, which in turn can lead to corrosion and deposits. This is often due to inadequate preparation and treatment of the filling, supplementary and circulating water as well as insufficient pressure maintenance and degassing. Therefore, VDI 6044 was published in April 2023 to proactively prevent damage in cold water and cooling circuits.

The guideline is based on BTGA rule 3.003 and applies to closed cold and cooling water circuits with a maximum circulating water temperature of $< 40^{\circ}\text{C}$ and a total volume $> 1,000\text{ l}$ (without buffer storage). Compared to the VDI guideline 2035, new values were included in the VDI guideline 6044, such as for chloride, sulfate and nitrate as well as TOC, iron, zinc, copper, aluminum and ammonium. The general total hardness requirement of $< 8.4^{\circ}\text{dH}$ is broader than in the VDI guideline 2035 due to the lower operating temperature prevailing in larger systems. These specifications must be taken into account in future planning, construction and operation in order to prevent operational disruptions or damage to the system.

VDI 6044 deals with, among other things:

- Preventing damage to cold water and cooling circuits
- Supplement to VDI 2035 for open and closed systems with and without frost protection of at least 1,000 liters and less than 40°C circulation temperature
- The guideline provides assistance in the planning, construction and operation of new and existing systems
- Considered state of the art since April 1, 2023

Why water treatment is worthwhile

Immediate and permanent
Protection of the system

Extends the service life of
the system

10-15% savings in energy
and costs

Reduces the risk of system
failures and disruptions

The standards affect an estimated high six-digit number of existing plants as well as new plants

- Cooling and refrigeration systems for industrial applications such as e.g. cooling systems, cold water sentences
- Food-related areas such as in e.g. deep-freeze chains, dairies, breweries
- Heating systems with underfloor heating, concrete core activations
- heat pumps with cooling brine cycles
- near-surface geothermal energy and cold district heating networks

Standard values for filling and make-up or circulation water

Standard values for filling and make-up or circulation water

		VDI 6044			ÖNORM H 5195-1	SWKI BT 102-01	
Parameters	unit	Corro- sion-re- sistant closed system	Corrosion-open system Operation increased salty	Operation low salt to low salt content	Note from 6044		
Appearance	–	clear, free from sedimenting substances			Turbidity, color and sedi- ment may indicate changes in water quality that require further analysis.		
pH value without aluminium alloys	–	8,2 -10,0			Limits the pH range in which top coats or passive layers metallic materials or plastics pH value is stable.	8,0 -9,5	8
pH value with alumi- nium alloys	–	8,2 -9,0				8,0 - 8,5	8,0 - 8,5
conductivity	µS/ cm	< 1,500	< 800	< 250	Limits the formation of sto- nes in the circulating water, if the limit is exceeded there is an increased probability of damage due to stone formation	< 1,500	< 200
Total hard- ness	°dH	< 8.5				< 17 (up to 1,000 l), < 6 (1,000-5,000 l), < 0.6 (from 5,000 l)	< 2.8
Chloride	g/m³	–	< 60	< 15	Increases the likelihood of corrosion damage caused by e.g. pitting corrosion, dezincification, stress corro- sion cracking (does not apply to copper).	< 30	< 30
Sum of sulfate and nitrate	g/m³	–	< 100	< 60	Relevant for MIC	< 130 mg/l (total with chlorides and nitrates)	–
Iron (total)	g/m³	< 0.5			Exceedances indicate in- creased corrosion activity on ferrous materials, the cause of which must be clarified.	< 0.5	< 0.1
ammonium	g/m³	< 0.5			Indicates microbiological processes.	Monitoring in case of increase	–
Copper, zinc, alumi- nium	g/m³	< 0.2			Exceedances indicate in- creased corrosion activity on copper or aluminum mate- rials, the cause of which must be clarified.	–	–
TOC of the untreated water	g/m³	< 25			Nutrient for microbiology	–	< 30

Treatment of the Make-up and circulating water

Treatment of make-up and circulating water

Before commissioning, the make-up water must be analyzed in advance for water chemistry and the results documented. Further protection is provided by checking the resulting circulating water after filling and before acceptance of the system. VDI 6044 lists all required guideline values in a table (see table). This includes, for example, information on the pH value, maximum total hardness and conductivity. A low-salt driving style is recommended from a corrosion point of view. In principle, VDI 6044 also recommends compliance with the relevant parameters of VDI 2035, especially in combined heating and cooling systems. Therefore, treatment devices that meet both standards are preferable.

Control and documentation

The circulating water quality must be checked no later than 48 hours after filling. Here it is important to measure at least the electrical conductivity and total hardness. Three months after commissioning, a complete analysis of the circulating water must be carried out and documented.



Safety through water treatment with UWS Technology

Our products are suitable for all manufacturers and materials

With our products you can achieve the required values according to VDI 6044, ÖNORM H 5195-1 and SWKI BT 102-01 in the shortest possible time

Ensuring warranty claims

Circulating water treatment using the bypass process

Professional cooling water treatment prevents corrosion in the cooling system with the help of desalination, softening and filtration. Therefore, depending on the requirements and system,

UWS has developed mobile and stationary treatment devices that provide all the necessary components in one device. Furthermore, UWS offers mobile UWS filtration units, vacuum degassers,

stationary side stream filters, make-up systems and pH monitoring if required.



DID YOU KNOW?

Professional cooling water treatment **improves the efficiency** of the cooling system by up to **10-15%**, depending on the initial condition of the cooling system. Regular maintenance and water treatment are recommended as part of annual maintenance to **reduce costs** and **extend the service life** of the system.



In order to ensure the water quality in closed systems according to VDI 6044, the circulating water must be continuously treated using the bypass process (side stream line). This enables the operator to reliably comply with the relevant specifications and prevent the system's performance degradation due to corrosion. The treatment devices are suitable for both mobile and stationary

use and can also be booked or rented as a service. Without interrupting operations, the cooling water can be treated to meet the requirements of VDI 6044. The devices in the Heaty Racun series for preparation and filling work largely automatically and do not need to be supervised throughout the entire process. Of course, UWS also offers treatment devices for smaller systems,

such as the Heaty Ferriline No.2 and Heaty Profiline No.2, make-up systems of the Complete series, Dual filters from the MAGella Twister series and the MAGella Side Stream Filter.

Advantages of holistic processing:

Improving system water quality in existing plants using the bypass method

Bypass treatment of the system water after initial filling with drinking water

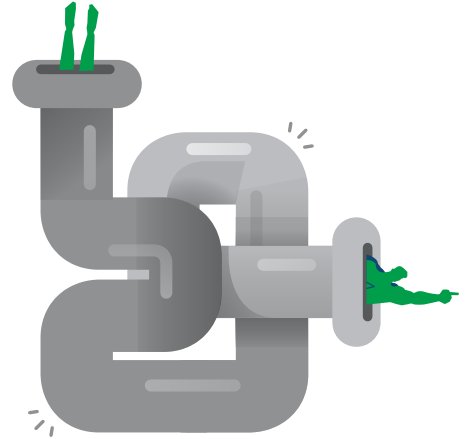
Saving energy costs and improving efficiency by avoiding stone formation and corrosion

Fast & flexible to use

Magnetite filtration with up to 11 x 12,000 Gauss and fine filtration < 1µm

Permanent monitoring of water quality in the plant and automatic treatment if limit values are exceeded

Automatic shutdown and notification to building management system via potential-free contact when mixed bed resin is used up



Conclusion

Cooling water treatment and preparation primarily aims to achieve the following goals for the entire system:

Protection against corrosion

Avoidance of deposits (lime-scale)

Limitation of biological growth

Filtration of contaminants (solids)

Degassing and monitoring

Planning, installation and operation are the three most important life cycle phases of a building technology system. VDI 6044 contains information for all three areas. The rule places particular emphasis on the extensive testing of filling and circulating water during commissioning.

- Oxygen is the number 1 cause of corrosion
- Chloride is the accomplice – other ions often counteract corrosion in contrast to!
- Sulfate and TOC are responsible for microbiological Corrosion (nitrate in copper)

Low-salt water is the best option



Efficient solutions for the right water treatment in cooling systems

In closed cooling circuits, the water is practically not renewed; it remains in the system for a very long time. Unlike in open cooling circuits, less strict hygiene requirements apply. HVAC companies therefore often encounter

circulating water that has been incorrectly treated with inhibitors or sealants by the operator. If the dosage is incorrect, these can intensify microbiological processes and corrosion. VDI 6044 describes in detail the ap-

pearance, possible causes and remedial measures for mineral, biological and corrosive deposits.

Your advantages with UWS

You always use the latest technology

Quality of treated water in accordance with standards

Clarification of object-related features

Approaches to solving problems

Providing the right equipment

Documentation of measurement and analysis values

Compliance with VDI 6044, ÖNORM H 5195-1 and SWKI BT 102-01



Relief for the trade: water treatment as a service

Many HVAC companies are fully occupied with their daily business. That is why UWS Technologie and its sister service provider HEATpower24 offer cold water treatment as a service.

We analyze the water, clarify object-related peculiarities and prepare the water. Of course, we also provide the necessary equipment.

We also take care of the filling, the necessary measurements and the final documentation according to VDI 6044, ÖNORM H 5195-1 and SWKI BT 102-01

our water. safe.

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Status 08/2024

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