

Translation of the original

ONI recommendation for the circulating water

Depending on the type of facility to be cooled, certain requirements are applicable to its cleanliness.

According to the contamination, suitable processes must be used for the treatment, cleaning and care of the water. To clean and care for the water, we recommend the ONI-Aquaclean.

We ask you to contact an authorized technical company for that. On request, our customer service can provide corresponding contacts.

Recommended general values for the quality of circulation water in atmospherically open or semi-open systems and the supply of temperature control units

based on BTGA 3.003 considering the specific manufacturer's requirements¹

Date: 04. May 2023; No liability assumed

	➤	➤	Limits ² Circuits up to 60°C	Limits ² Circuits up to 60°C to 90°C	Limits ² Circuits up to 90°C to 180°C ³
Appearance	➤	➤ —	Clear, no sediment	Clear, no sediment	Clear, no sediment
Colour		➤ —	Colourless	Colourless	Colourless
Odour		➤ —	None	None	None
pH-value at 25°C		➤ —	7 – 8,5	7 – 8,5	7 – 8,5
Conductivity	μS/cm	(mS/m)	< 2000 (200)	< 1500 (150)	< 600 (60)
Ammonium	g/m ³	NH ₄	< 5	< 2	< 1
Chloride	g/m ³	Cl	< 80	< 60	< 30
Sulphate	g/m ³	SO ₄	< 100	< 80	< 30
Total hardness	°dH	Ca / Mg	0 - 4	0 - 2	< 0,5
Product content					
Molybdenum	g/m ³	Mo	≥ 150	≥ 150	> 150
or Polymer	g/m ³	Po	≥ 50	≥ 50	≥ 50
Colony forming units^{4;5}	CFU/ml	—	< 10.000	< 10.000	< 10.000

In addition, the circulating water must be completely free of glycol and oil.

- 1 - The manufacturer's guidelines must be followed in all cases.
- 2 - Depending on the materials used and on the particular situation on site, stricter limits may apply.
- 3 - In cooling circuits with a water exchange rate, a complete water change must be carried out once a year.
- 4 - If the microbial count (number of colony-forming units CFU) increases, use additional ONI disinfectants.
- 5 - If a biocide is used, the dead biological matter and decomposition products must be removed by way of regular partial water changes.



Recommended general values for the quality of circulation water in closed systems

based on VDI 2035 considering the specific manufacturer's requirements⁶

Date: 04. May 2023; No liability assumed

	➤	➤	Limits ⁷ for closed circuits with glycol	Limits ⁷ for closed circuits with degassing station		Limits ⁷ for Closed circuits with corrosion inhibitor
	➤	➤		Low-salt	salty	
Appearance	➤	—	Clear, no sediment	Clear, no sediment	Clear, no sediment	Clear, no sediment
Colour	➤	—	Colourless	Colourless	Colourless	Colourless
Odour	➤	—	None	None	None	None
pH-Value at 25°C	➤	—	7 – 8,5	8,2 – 10,0 ⁸	8,2 – 10,0 ⁸	7 – 8,5
Conductivity	μS/cm	(mS/m)	< 2000 (200)	< 100 (10)	< 1500 (150)	< 1500 (150)
Ammonium	g/m ³	NH ₄	< 5	< 5	< 2	< 5
Chloride	g/m ³	Cl	< 80	< 60	< 60	< 60
Sulphate	g/m ³	SO ₄	< 100	< 80	< 80	< 80
Oxygen content	g/m ³	O ₂	< 0,1	< 0,1	< 0,02	< 0,02
Total hardness	°dH	Ca / Mg	0 - 4	< 0,5	0 - 2	0 - 2
Product content						
Ethylene glycol,	%		≥ 35			≥ 150
Molybdenum	g/m ³	Mo				≥ 50
or Polymer	g/m ³	Po				
Colony forming						
units	CFU/ml	—	< 10.000	< 10.000	< 10.000	< 10.000

6 - The manufacturer's guidelines must be followed in all cases.

7 - Depending on the materials used and on the particular situation on site, stricter limits may apply.

8 - For aluminium or aluminium alloys, the pH-value range is limited (8,2 - 8,5 or 9,0).



Recommended general values for the quality of circulation water in open systems

based on VDI 3803 considering the specific manufacturer's requirements⁹

Date: 04. May 2023; No liability assumed

	➤	➤	C - Steel Non-ferrous metals and VA steels¹⁰ (Material in contact with water)
Appearance	➤	➤ —	Clear, no sediment
Colour		➤ —	Colourless
Odour		➤ —	None
pH-Value at 20°C		➤ —	7 – 9,0 ¹¹
el. Conductivity (25°C)	mS/m	LF	< 220
Alkalinity	mol/m ³	Ca ²⁺ ; Mg ²⁺	0,5 – 11 ¹²
Total hardness	°dH	GH	2,8 – 60 ¹²
Acid capacity up to pH 4,3	mol/m ³	KS _{4,3}	< 7 ¹²
➤ Carbon hardness when using hardness stabilisers	°dH	KH	< 20 ¹²
Acid capacity up to pH 4,3	mol/m ³	KS _{4,3}	< 1,4
➤ Carbon hardness when using hardness stabilisers	°dH	KH	< 4
Chloride	g/m ³	CL	< 150 ¹³
Sulphate	g/m ³	SO ₄	< 325
Colony forming units	CFU/ml	CFU	< 10.000 ¹⁴
Legionella	CFU/100ml	CFU	< 10

9 - The manufacturer's guidelines must be followed in all cases.

10 -Mixed installation: Irrespective of the type of mixed installation, the use of unprotected carbon steel is only permissible with suitable corrosion inhibition.

11 -For aluminium or aluminium alloys, the pH value must not exceed 8,5.

12 -When using softened water, the values for carbon hardness or acid capacity may be higher up to pH 4.3. In this case, the total hardness must be limited to max. 20°d (alkaline earths max. 3,5 mol/m³) and a hardness stabiliser must be added.

13 - Upper limit of the chloride content to avoid the chloride-induced pitting corrosion tendency of Cr-Ni-Mo steels, taking into account their molybdenum content and the occurring metal wall temperature. Higher chloride loads require Cr-Ni-Mo steels with increased pitting resistance due to increased molybdenum content. If Cr-Ni steels without molybdenum content, e.g., 1.4301 / 1.4307 / 1.4371, are used, the maximum values of the circulating water in ONI cooling water systems shall apply

14 - If the Colony forming units increases, use biocide. If cooling tower vapours inadmissibly affect offices and areas where people are staying or are in the intake area of air conditioning systems, the permissible bacterial count must be < 1,000 CFU/ml (site-dependent assessment). Slime-forming deposits in the cooling tower sump must be checked separately by manual sensory testing.

