

Technical Data

Manufacturer **JAEGGI Hybridtechnologie AG**

Type:	HTK 2.4/10.4-2S-P3-CU-SLNF		
Total cooling capacity	1'894		kW
Number of units	1		No.

Calculation

1 cooler

Cooling capacity/unit	1'894		kW
Cooling Medium	30% ethylene glycol		
Cooling Medium - Temperature inlet/outlet ²	39 / 31		°C
Cooling Medium - Flow Rate	218.00		m ³ /h
Elevation	300.0		m

Technical data / cooler

Process side	Pressure drop	84		kPa
	Coolant velocity in the tube	1.63		m/s
	Hydraulic configuration	Parallel, 3-pass, Cross counter current		
	Headers - no. of connections	4 x DN 150		
	Design pressure/ Test pressure	6 / 8		bar

		wet	dry	
Air side	Fan speed	70%	100%	Nominal
	Air inlet temperature / RH	36°C / 35%	17°C	
	Wet bulb temperature (Inlet)	23.3 °C	not relevant	
	Volume flow	56.3	95.4	m ³ /s
	Factor L1	4.45	7.71	
	Air outlet temperature	32.4°C / 86%	34.7°C	
	Factor L2	69	102	
	Number of fans per cooler	4		No.
	Additional external pressure drop	0		Pa

Deluge Wetting Water per cooler (Design point)	Evaporation water quantity	3.085		m ³ /h
	Concentration factor (Softened / Demineralised)	3 / 8		ratio
	Draining (Softened / Demin.)	1.542 / 0.441		m ³ /h
	Make-up water quantity (Softened/Demin)	4.627/3.525		m ³ /h
	Number of pumps	2		No.
	Absorbed power wetting pump	0.9		kW

Dimensions (per cooler)	Length over flanges (cooler only)	11'407		mm
	Length including switchgear cabinet roof	12'032		mm
	Width	2'460		mm
	Height from foundation	3'928		mm

Weight (per cooler)	Installed weight	9'879		kg
	Weight of water - cooling circuit	1'584		kg
	Weight of water - wetting circuit	857		kg
	Operating weight	12'320		kg

Heat exchanger	Fin thickness	0.3	mm
	Material and condition	AL 99,5	hard
	Fin pitch	2.8	mm
Materials/ Corrosion Protection	Tubes/cooling fins	CU/AL, hard rolled	
	Water basin	Stainless steel	
	Housing	Steel, hot dip galvanized	
	fan housings	Steel, hot dip galvanized	
	Corrosion protection coils	KTL (Kataphoretic -Dip -Lacquer)	
Fan	Number of fans for 1 cooler	4	No.
	Fan type	SLPF31830	
	Absorbed fan shaft power max. ¹	4 x 4.29	kW
	Fan number of revolutions (100%)	429	1/min
	Sound power level per cooler wet/dry	77/85	dB(A)
	Mean sound pressure level at 10m distance from cooler acc. to surface envelope EN 13487		
	wet/dry	43/52	dB(A)
	Tolerance	+/-2	dB(A)
Fan motor	Number of motors for 1 cooler	4	No.
	Rated output for each motor	5.50	kW
	Number of revolutions	1460	1/min
	Electrical Supply	400	V
	Rated current for each motor	10.5	A
	Frequency	50	Hz
	Enclosure	IP 55	
	Motor protection	Thermo contact	
Transmission	Belt/Pulley	low noise belts	
		Application factor min. 2,5	

Dry Operation During Part/Reduced Load		Air Temp.	Cooling Water Temperature	
100% duty		17 °C	39 / 31.0	°C
80% duty		19.8 °C	37.4 / 31.0	°C
60% duty		22.6 °C	35.8 / 31.0	°C
40% duty		25.4 °C	34.2 / 31.0	°C

A4-998c-T1.16-P6-0-Z6-0-
H1.6-W0.10

Important remarks / explanatory notes:

- 1) This unit is equipped with fans that meet the efficiency requirements of Directive 2009/125/EC (ErP Directive)
- 2) Maximum permissible cooling medium inlet temperature (continuous load):
 - Cooling medium inlet $\leq 60^{\circ}\text{C}$: cooler dry and fans in operation.
 - Cooling medium inlet $\leq 50^{\circ}\text{C}$: cooler wetted $\rightarrow$ desalinated (reverse osmosis) or demineralized water.
 - Cooling medium inlet $\leq 40^{\circ}\text{C}$: cooler wetted $\rightarrow$ misc water (e.g. softened).

Required quality for makeup and circulation water (wetting water)

			<i>Softened makeup water</i>	<i>Low-salt water</i>	Circulation water
Material in contact with water			<i>Stainless steel , aluminium</i>		
Look	-		<i>Clear, without sentiments</i>		
Color	-		<i>colorless</i>		
Smell	-		<i>none</i>		
pH value at 20 °C	-		<i>6,5 – 8,3</i>		
el. Conductivity (25 °C)	µS / cm	EC	<i>< 600</i>	<i>< 20 (after dosing <100)</i>	<i>< 1600 (follow max. concentration factor 3/ 8)</i>
Alkaline earth metal oxides	mol / m ³	Ca ²⁺ , Mg ²⁺	<i>< 0,02</i>		<i>< 0,2</i>
Overall hardness	°d	GH	<i>< 0,1</i>		<i>< 1</i>
Chloride	g / m ³	Cl ⁻	<i>< 40</i>		<i>< 100</i>
Sulfate	g / m ³	SO ₄ ²⁻	<i>< 90</i>		<i>< 280</i>
Cu-ions	g / m ³	Cu ²⁺	<i>< 0,05</i>		<i>< 0,05</i>
Ammonium	g / m ³	NH ₄ ⁺	<i>< 2</i>		<i>< 2</i>
Colony-forming units	CFU / ml	CFU	<i>< 100</i>		<i>< 10000</i>
Pseudomonas aeruginosa	CFU/100ml	CFU	<i>< 100</i>		<i>< 100</i>
Legionella spp.	KBE/100ml	CFU	<i>< 100</i>		<i>< 100</i>
Max. concentration factor	-		<i>3 times</i>	<i>8 times</i>	<i>3 / 8 times</i>

1° german hardness (dH) = 1,8° french hardness (fH)

Stand 06.11.2015

= 1.25° English (Clark) hardness

= 1.07° USA hardness

= 17.8 mg/liter Calcium Carbonate (CaCO₃)

Circulation water values have to be strictly observed none of the limits including concentration factor may be exceed during wetted operation.

- ☞ *The chemical properties of the wetting water should be regularly analysed. Measurements should be carried out and documented every second week, until the values are verified to be stable. This should be checked every 8 weeks according to the maintenance manual. During noncompliance with the water specification values or lack of measurements and documentation JAEGGI will reserve the right to limit the warranty.*
- ☞ *If one of the mentioned values exceeds the limit constantly during operation, then the concentration factor (upper limit of the conductivity) has to be reduced to keep all values below their specified limits.*
- ☞ *The makeup and circulated wetting water should be tested for microbiological content especially Pseudomonas Aeruginosa and Legionella in accordance with local legislation and in respect to a site specific risk assessment (at latest every three months).*

- ☞ Beyond the guidance within the operation and maintenance manual of the unit, the following documents must also be referenced and respected:

<i>EU</i>	<i>Eurovent 9/7-2011 Recommended code of practice to keep your cooling system efficient and safe</i>
<i>D</i>	<i>VDI 2047-2 Sicherstellung des hygienegerechten Betriebs von Verdunstungskühlanlagen (VDI-Kühlturmregeln)</i> <i>VDMA 24649 Hinweise und Empfehlungen zum wirksamen und sicheren Betrieb von Verdunstungskühlanlagen</i>
<i>F</i>	<i>ICPE 2921 Refroidissement évaporatif par dispersion d'eau dans un flux d'air généré par ventilation mécanique ou naturelle (installations de)</i>
<i>UK</i>	<i>HSG 274/ ACOP L8 Legionnaires' disease, Technical guidance</i>

- ☞ Additional international, national and regional regulation must be observed.
- ☞ Water supply line should not made of copper tubes because of their tendency of discharging copper ions to the makeup water during first time of operation (see limits for copper ions).

sample drawing

