AeroCool

EVAPORATIVE COOLING SYSTEM

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Delivery check

Each box of AeroCool contains an item list. This list is also published in this manual. Before opening the boxes inspect the external damage in the boxes and if found contact your forwarding agent before opening. If safe, open the boxes and compare the quantities of products in each box with the item list. If there is any differences please contact your sales agent. Please note that the boxes include small and numerous items that can be lost easily. So please do not open the boxes if not be used or keep it in a closed, safe and dry place.

Disclaimer

We preserve the right to make alterations to specifications, quantities, dimensions, etc. for production or other reasons subsequent to publication. The information obtained herein has been prepared by qualified experts. While we believe the information is accurate and complete, we make no warranty or representation for any particular purpose. The information is offered in good faith and with the understanding that any use of the units or accessories in breach of the directions and warnings in this document is at the sole discretion and risk of the user.

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1 General introduction

This manual is intended for the installer of this device. It contains all the information necessary for mounting, installing and maintaining this product. Please read all information and instructions carefully before mounting and installing the product.

Symbols mark warnings, important notes, tips, etc. in this manual.

Stienen has compiled this manual with all due care. If you find any errors, please let us know.

1.1 Symbols and definitions


Risk of injury by dangerous electric shock. Danger to people and animals.


Warning indicating danger to product, people and animals if procedures are not strictly complied with.


Warning indicating damage to products if procedures are not strictly complied with.


Pressure cleaning is not allowed.


Collect as separate flows


Important note


Additional information


Example of a concrete application of the functionality described.


Example calculation


Manual control


Tips and advice


Screenshot


Application note

1.2 Stienen customer service

If you have any questions, please contact our Customer Service Department. Be sure to have all the necessary data handy. You should also always write down the cause of a fault and the circumstances that occurred during the fault. This will enable you to avoid any ambiguities and it will enable us to deal with any faults quickly and effectively.

2 Safety instructions and warnings

Read the general safety instructions in this chapter carefully before using the device. A certified installer must install the device and resolve any faults, in accordance with the applicable guidelines. If this product is installed and used in any other way, the warranty will not apply.

2.1 During use

The people who operate the device have read the manual carefully. They are aware of potential hazards that may arise from improper use and maintenance of the product.

Check the device for any damage at regular intervals. A damaged device is unsafe. Always report any damage to your installer.

Electronic equipment is splash-proof and must not be cleaned using a pressure cleaner.

If any emergency has occurred, write down: the circumstances under which the emergency occurred, installation settings, software date, software version number and possible causes.

2.2 Disposal

This product must be disposed according to the laws governing the local provisions for recycling. If required, contact your local authorities for information regarding the available disposal facilities.

Electrical and electronic equipment must be collected separately at the end of its life.

3 Water quality requirements

3.1 Introduction

The life and efficiency of the cooling system, and in particular the evaporative cooling pads, are highly dependent on the quality of the locally supplied water. The pad cool system circulates and evaporates the water supplied to the system, creating the air cooling effect. The supplied water always contains a certain amount of dissolved minerals, and external substances may be added to or absorbed by the water during use. During evaporation only the H_2O molecules evaporate, all dissolved minerals or other substances remain in the water or remain on the pads as the water dries up. This causes a continuous increase in the concentration of dissolved minerals or other substances in the water and subsequently an increase in the pH of the water. Over time, these become harmful to the bonded gutter system and paper pads, leading to collapsing or clogged pads, algae growth and loss of cooling and ventilation.

To maintain mineral content and pH at desired levels:
- Water quality guidelines must be met;
- A certain amount of water must be changed continuously (see chapter 4.4);
- The system must be operated correctly (see chapter 5);
- Regular maintenance must be carried out (see chapter 6).

3.2 Water quality data

Parameter	Supply water	Bleed water	Reason
pH	6.0 - 8.5	7.0 - 9.0	Too low → paper becomes brittle Too high → cooling pads become fluffy and weak. Increased algae growth.
$CaCO_3$ (mg/l)		< 200	Too high → cooling pads get clogged due to calcification, cooling pads turn to stone.
TDS (ppm)		< 900	Too high → cooling pads get clogged by mineral deposits.
Conductivity (mS/m)		< 100	Too high → cooling pads get clogged by mineral deposits.
Chlorine/Bromine (mg/l)		0	Cooling pads become soft and their life span is shortened. Both are highly volatile and do not stay in the water. Chlorine loses its effectiveness.

3.3 Authorized water sources and requirements

Deep wells or municipal water supplies are recommended. Seawater, brackish water and recycled water are <u>not</u> recommended.

- Lake and river water should be filtered and chemically treated against microbial growth;
- Rain water, reverse osmosis water, demineralized water or softened water should be used with caution as it requires very low discharge volumes;
- Water supply pressure = 2-3 bar.

4 Starting up the system

4.1 Initial commissioning

1. After the gutter, cooling pads and plumbing kit have been installed, connect the water supply hose to the float valve connector and connect the pump to the electrical supply. Electrical connections should be done by a qualified electrician according to local laws and regulations.
2. Partially fill the water gutter with water.
3. Flush dirt and debris from the water gutter by opening the drain valve (Fig. 1).
4. Close the drain valve and fill the water gutter completely.
5. If necessary, adjust the float valve to create a water column of 20 cm. This is to prevent the bottom of the pad media from sitting in the water.
6. Fill the pump with water through the filter cover to the bottom of the suction line. Put the filter cover back in place and screw it on tightly.
7. Open the water supply valve (Fig. 2, ball valve above the pump), run the pump and flush the distribution line if dirty water lines are installed.
8. Close the drain line valves, restart the pump, run the water over the pads for 15 minutes and note any leaks.

Fig. 1 Drain valve

Fig. 2 Water supply valve

4.2 Water pressure and distribution

Proper water pressure in the distribution line is reached when the jet of water sprays 22-25 cm from the water distribution openings (Fig. 3). This should be measured at the farthest point from the water pump. This can be done by removing the front pad guide (Fig. 4). Move the pad guide lock aside. If the result is more or less than 22-25 cm, adjust the water supply valve and repeat the measurement.
If the water pressure is too low, the water will not be distributed by the deflector, causing streaks and dry spots on the pad surface. This shortens pad life and lowers system cooling performance. Too much water (spraying like a flood) softens the pads and makes them inefficient. The pads are more efficient when they have just enough water to stay wet.

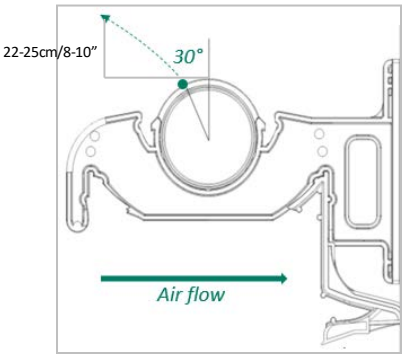


Fig. 3 Water jet height

Fig. 4 Front pad guide

4.3 Soaking period

New cooling pads have a smooth surface and get wet more slowly than a pad that has been in use for a while. A soaking period allows the user to optimize the true cooling phase. Run the pump continuously for 1 or 2 days. During this period, the system can be checked for dry streaks on the pad. This indicates a problem with the water distribution system or clogged holes. Clear any clogged holes by inserting a rod or plug into the hole.

4.4 Bleeding off

The bleed valve should be used to continuously drain and exchange water to maintain proper water quality in the water gutter.
Regularly check bleed water quality for pH, alkalinity, TDS and conductivity. Increase the bleed rate if the result exceeds bleed water quality guidelines. Poor supply water requires a high bleed rate. Very dry outdoor conditions also require a higher bleed rate because the evaporation is higher. The bleed valve should be connected to a drain, do not route the bleed back to the gutter as this will defeat the function of the bleeding. Ensure that the position of the bleed valve is secured with a warning sign or lock to prevent unauthorized changes.

Use a bleeding rate of 0.2 l/minute/running meter of gutter as a starting point. Calibrate the bleed rate after the position of the water supply valve has been set correctly.

System length (m)	Total bleeding required (l/minute)	Time to fill a 10-liter bucket (minutes:seconds)
6	1.2	08:20
9	1.8	05:30
12	2.4	04:10
15	3	03:20
18	3.6	02:45
21	4.2	02:20
24	4.8	02:05
27	5.4	01:50
30	6	01:40

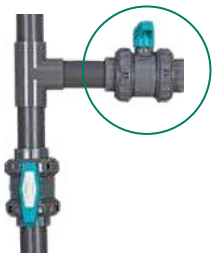


Fig. 5 Bleed valve

5 Operating the system

5.1 Points of attention

- Allow the cooling pads to dry completely every 24 hours;
- Place as much shade as possible on the pads, cooling system and pump;
- Avoid harmful contaminants such as dust, fertilizers, fumes, harsh detergents or water treatment chemicals;
- Maintain an appropriate bleed rate;
- Drain the water gutter weekly during the cooling season.

5.2 Annual startup

When starting the new cooling season, the following procedure help to ensure that the system is performing properly.

1. Re-install the water pump and connect to the power supply;
2. Open the main water supply to the cooling system;
3. Check the gutter system and pipes to make sure there are no rodents, birds or their nests;
4. Perform a test run, fill the water gutter, open the water supply valve and start the pump for one or two hours. Check for leaks, dry streaks and clogged distribution holes;
5. Perform a water pressure and distribution test;
6. Check if the bleed valve is set properly.

5.3 Winterizing the system

Winterize the system at the end of each cooling season. This ensures a quick startup with minimal repairs when the system is put back into service. Even if freezing is not a problem, water remaining in the system can collect sediment, algae or bacteria that block the pump filters and distribution holes when the system is restarted.

1. Turn off the pump and shut off the main water supply to the cooling system;
2. Disconnect the power supply to the pump;
3. Let the pads dry completely to prevent rotting, in case the pads are covered;
4. Drain the water gutter by opening the drain valve, close again when the gutter is empty;
5. Remove the water pump and clean the water filter;
6. Store the water pump in a safe and dry place until the next season;
7. Close all valves and seal large holes (pump inlets or other) to prevent insects or small animals such as rats from entering the cooling system.

5.4 Cleaning the system

1. Ensure the pads are completely dry, by turning off the pump 1 hour before cleaning;
2. Use a broom or vacuum cleaner to remove loose dirt, cobwebs or feathers from the pad;
3. Clean the pump filter;
4. Remove the pads from the frame. Broken or damaged pads should be replaced. Gently wash the pads from both sides using a hose with a spray attachment (low water pressure) and a soft brush. Always brush from top to bottom. It is important to point the hose in the same direction as the pad flutes;
5. Clean the pad frame with a pressure washer;
6. Clean the gutters by removing sediment and large pieces by a vacuum cleaner. Disinfect afterwards;
7. Activate the pump and clean all distribution holes in the distribution tube;
8. Flush the distribution line by activating the pump and open the valves at the end of the distribution line;
9. Once the cooling pads have dried, reattach them into the frame with the correct orientation;
10. Refill the water gutter with clean fresh water and resume normal operation.

6 Maintaining the system

Maintenance activity	daily	weekly	monthly	quarterly	annually
Visual inspection	×				
Clean pump filter		×			
Drain water gutter		×			
Check bleed vale position		×			
Analyse supply and bleed water quality				×	
Clean system				×	×
Replace water pump	if necessary				
Replace cooling pad	if necessary				

7 Troubleshooting

7.1 Overall troubleshooting

Problem	Observation	Check / Action
High air temperature in the house (Heat stress)	Low air flow and/or Low air speed	▪ Check operation of exhaust fans, clean/maintain exhaust fans; ▪ Check that the house is sealed (doors, openings must be closed); ▪ Check that any cover for cooling pads or curtain is up.
	Pads are not becoming wet	▪ Check cooling pads. If clogged: clean or replace pads; ▪ Continue with *Troubleshooting AeroCool*.
High relative humidity	Pad cooling turns-off too late	▪ Lower maximum humidity setting for tunnel ventilation; ▪ Check RH sensor measurement.

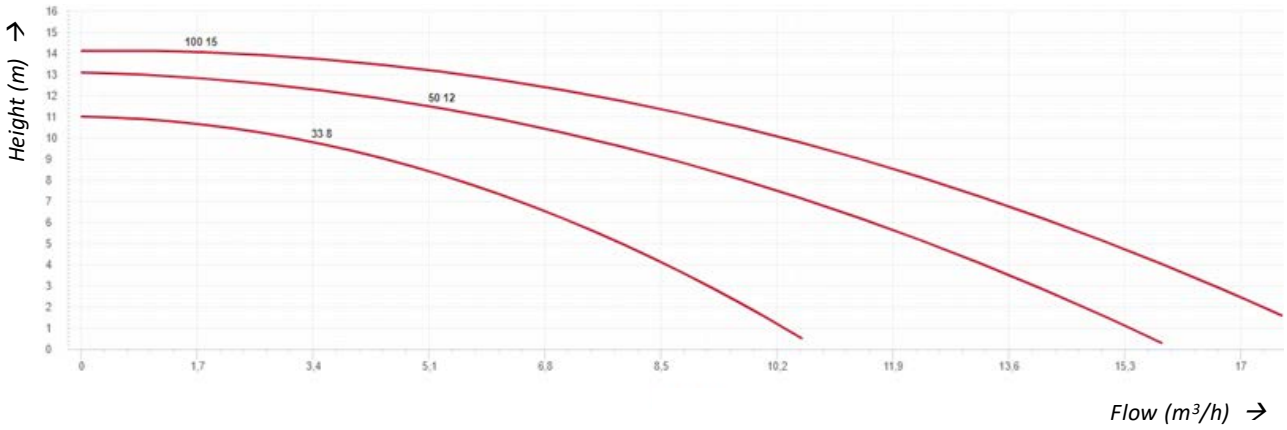
7.2 AeroCool troubleshooting

Problem	Observation	Check / Action
Airflow is good, but no effective cooling	Pads do not get wet	▪ Check water level in the water gutter. Water inlet or float valve troubleshooting; ▪ Check that the water supply valve is open; ▪ Check that the pump is connected to power. Connect to power supply; ▪ Check whether the pump needs to be primed and whether there is air in the pipes: remove air or prime pump; ▪ Check whether the pump filter is clogged: clean the filter.
	Pads become partially wet / dry streaks appear	▪ Verify that the holes in the distribution line are open. Clean holes with a stiff wire when clogged and flush the distribution line; ▪ Check for leaks in the distribution system (gutter, distribution line, trash pipe valves). Repair leaks; ▪ Check for clogged pump filter: clean filter; ▪ Check the height of the water jet and adjust the water supply valve.
Pads are clogged	Algae on pads	▪ Perform *5.4 Cleaning the system;* ▪ Keep the pads and cooling system in the shade; ▪ Keep nutrients and fertilizers away from the pads; ▪ Drain and clean the water gutter weekly; ▪ Increase the bleeding rate.
Pads are clogged	Many mineral deposits	▪ Analyse bleed water quality and increase bleed rate accordingly; ▪ Execute *5.4 Cleaning the system;* ▪ Drain the water gutter weekly.
Flooding water gutter	Floater valve is not set correctly	Repair float valve.

8 Technical pump data

Model 230V/50Hz	Required flow rate (m^3/h/running meter gutter)	System length (m)	I (A)	Input power P1 (kW)	Motor power P2 (kW)	P2 (HP)
Silen I 33 8	0.56	< 12	2	0.45	0.25	0.33
Silen I 50 12	0.56	12 - 24	2.8	0.65	0.37	0.50
Silen I 100 15	0.56	24 - 33	3.8	0.85	0.75	1.00

Graph 1: Water flow as a function of discharge height



Graph 2: Water flow as a function of power