

OPERATION AND MAINTENANCE for falling film chiller

Model Riple plate FR3



- Operation check list
- Maintenance
- Solving basic problems

Operation and Maintenance

Falling film chiller



Water sump tank is optional

Before Machine Operating

- ✓ the inlet water temperature and flow rate water are as designed (According to the sales agreement).
- ✓ Check water quality to meet standard.
- ✓ Evaporator plate must not be free of dirt scale.
- ✓ Water pouring hole in the top water tray are not clogged.
- ✓ Machine cover are closed.
- ✓ The lower basin must be free of sediment or contaminants.
- ✓ Check water level control equipment, pumps, valves and floating ball to work normally.
- ✓ Check the cooling system is in normal condition.

While the machine operating

- ✓ The inlet water temperature and flow rate water are as designed.
- ✓ The outlet water temperature and flow rate water are as designed.
- ✓ The water level in the upper water tray is not abnormally high or low.
- ✓ Water flows through every hole in the upper water tray.
- ✓ Evaporator plates must be free of ice.

MAINTENANCE

Evaporator plates function to exchange heat with water flowing on the plates to produce cold water. But the dirtiness of the sheet surface whether scale and corrosion It will be an obstacle to making cold water and cause the compressor energy of the system to be wasted.

More cooling Slag that is only 0.5 mm thick requires up to 18% more energy to drive the compressor approximately.



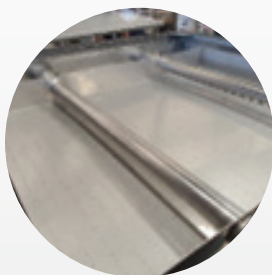
Normal condition



Abnormal condition

Maintenance of upper water tray and lower water tray equipment

The upper water tray and water basin should be cleaned regularly. If there is a blockage in the upper water tray, it will result in the machine not working efficiently and causing ice to stick to the plate, causing damage or leakage to the plate.



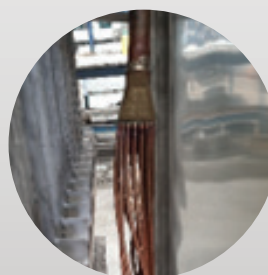
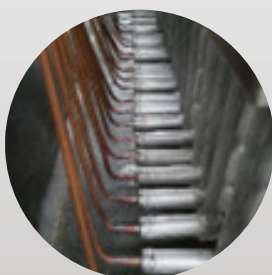
Upper tray water normal condition



Lower sump tank normal condition

Maintenance of liquid distribution pipes

The liquid distribution pipe can be washed and cleaned. Avoid using cleaning agents, detergents, and disinfectants such as Alkaline detergents. See the section. "Prohibited disinfectants/recommended disinfectants."



Normal condition

Water sump tank is optional and liquid distribution device is available only for the DX model

MACHINE INSPECTION AND MAINTENANCE LIST

Machine inspection and maintenance list	Period of inspection and maintenance				
	Before Operating	Monthly	Bi-yearly	Yearly	Machine stopped
Clean every water cooling parts		✓	✓	✓	✓
Check the water level in the upper water tray	✓				
Check the water drain pipe	✓				✓
Check the valve (add water and drain)	✓		✓		✓
Check inlet water temperature does not exceed the designed value*	✓				
The machine must be all covered	✓			✓	

* Inlet water temperature as agreed upon for sale. If there is a change in the temperature of the inlet water, the cool water temperature will not be as desired.

Instructions for washing machines.

Cleaning should be done frequently. Because it will reduce the chance of the accumulation of dirt and germs that will contaminate the cold water. Should use water that is of the same quality as water used in food production or soft water because soft water will save cleaning agents. If the water hardness is higher, it will reduce the efficiency of disinfection. and do not use hot water to wash because the machine has refrigerant in the system. Will cause damage to the machine. Use a brush that will not harm the surface of the stainless steel, and do not use a brush made of metal wire. A high-pressure water sprayer can also be used (High-pressure water pumps) to help in washing machines in areas that are difficult to scrub with hands.

Recommended disinfectants

Chemical name	molecular formulas	Concentration % Mass	Temp. °C
Hydrogen peroxide	H ₂ O ₂	5	20
		10	23
		10	40
		15	22
		15	30 – 40
		30	27
Ethyl alcohol	C ₂ H ₅ OH	Con. All	20 – 40
Chloroxylenol	C ₈ H ₉ C ₁₀	Con. All	20 – 40

Prohibited disinfectants

Chemical name	molecular formulas	Concentration % Mass	Temp. °C
Sodium hypochlorite	NaOCl	5	20
Sodium chlorite	NaCl	Con. All	20 – BP
Povidoneiodine	Do not use in all case		
Iodine in iodophor	Do not use in all case		

Bp = Boiling solution.
Consultation should be sought directly from the manufacturer of the disinfectant of cleaning agent.

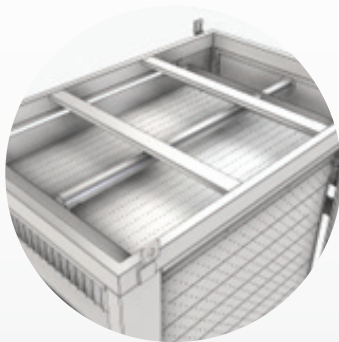
Be careful!!! The level of residual chlorine in the water must not exceed 2-3 ppm for grade 304 stainless steel at pH 6.5 - 8, temperature 25 °C because if the amount of residual chlorine exceeds the specified limit, it can cause local corrosion such as crevice & pitting corrosion or stress corrosion cracking (SCC)

HOW TO CLEAN

1. Remove the machine cover and drain all water from the machine.



2. Spray with water to remove dirt by placing the water tray on Structure ice plate and bottom water basin.



3. Continue washing with cleaning solution. The type of solution, concentration, and length of time used depends on the type of dirt. Methods and tools used for cleaning.

Table of water volume in the basin for calculating the amount of solution added.

Model	Water quantity (L)
FR3-1	180
FR3-2	310
FR3-3	440
FR3-4	570
FR3-5	700

4. After washing the solution away. Continue rinsing with water. To remove any remaining cleaning agents.

5. Wash again with disinfectant to help reduce the amount of microorganisms that may contaminate the machine's surface.

6. Rinse with clean water for the last time and check that there are no residues in the machine, such as checking the color, odor, and measuring the pH of the water, etc.

WATER IS THE MAIN FACTOR AFFECTING THE MACHINE.

Components of water such as pH value, total solution value (TDS), hardness value, if the amount is high, it has the opportunity to show the behavior of easily crystallizing precipitate on the surface of the metal. Chloride-type substances (Chlorides) result in corrosion of metals. This will cause damage to the machine. So that the cold water can come into contact with the food. Water used for production must be water of quality or standards according to the Ministry of Public Health Announcement No. 135 regarding drinking water in tightly closed containers.

PHYSICAL PROPERTIES

Properties	The highest criteria
color	20 Hazen unit
smell	no smell (not including chlorine smell)
turbidity	5 silica scale unit
pH	6.5 – 8.5

CHEMICAL PROPERTIES

PROPERTIES	THE HIGHEST CRITERIA (MG/L)
TOTAL SOLIDS (TSD)	<500
TOTAL HARDNESS	<100
ARSENICAL (AS)	<0.05
BARIUM (BA)	<0.1
CADMIUM (CD)	<0.01
CHLORIDE (CL)	< 250
CHROMIUM (CR)	<0.05
COPPER (CU)	<1.0
FERRITE (FE)	<0.3
LEAD (PB)	<0.1
MANGANESE (MN)	<0.05

PROPERTIES	THE HIGHEST CRITERIA (MG/L)
MERCURY (HG)	<0.002
NITRATES (NO3-N)	<4
PHENOLS	<0.001
SELENIUM (SE)	<0.01
SILVER (AG)	< 0.05
SULFATE (SO4)	<3
FLUORIDE (F)	<1.5
ALUMINUM	<0.2
ALKYLBENZENE SULFONATE	<0.2
CYANIDE	<0.1

BASIC PROBLEM SOLVING

Deformation	Cause	Troubleshooting
OUTLET WATER TEMPERATURE NOT AS SPECIFIED	The inlet water temperature is not as designed.	Adjust the water temperature to match the designed value.
	The cooling system is in an abnormal condition.	Check the cooling system
	Ice has formed on the evaporating plate.	Defrost the ice.
	The hole in the top water tray is clogged.	Clean the upper water tray.
	There is scale clinging to the evaporating plate.	Adjust water quality to match the recommendations in the manual.
OUTLET WATER VOLUME WAS NOT AS SPECIFIED.	Inlet water volume is not as designed.	Adjust the Inlet water volume to match the designed value.
	The hole in the top water tray is clogged.	Clean the upper water tray.
	Defective valve equipment	Repair or replace equipment
	There is sediment blocking the water outlet.	Clean the tank.
ICE HAS FORMED ON THE EVAPORATING PLATE.	The inlet water temperature is lower than designed.	Adjust the water temperature to match the designed value.
	The inlet water quantity is lower than designed.	Adjust the water quantity to match the designed value.
	The hole in the top water tray is clogged.	Clean the upper water tray.
WATER IS NOT Poured OVER THE EVAPORATING PLATE.	Inlet water volume is not as designed.	Adjust the Inlet water volume to match the designed value.
	The hole in the top water tray is clogged.	Clean the upper water tray.
WATER OVERFLOWS FROM THE UPPER WATER TRAY.	The hole in the top water tray is clogged.	Clean the upper water tray.

RHYCOOL

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Model Riple plate FR3

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