EVER
-HEAT EXCHANGER-

BRIEF INTRODUCTION

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EVER
-HEAT EXCHANGER-
EVER - POWERED FUTURE
STAINLESS STEEL / TITANIUM / COPPER

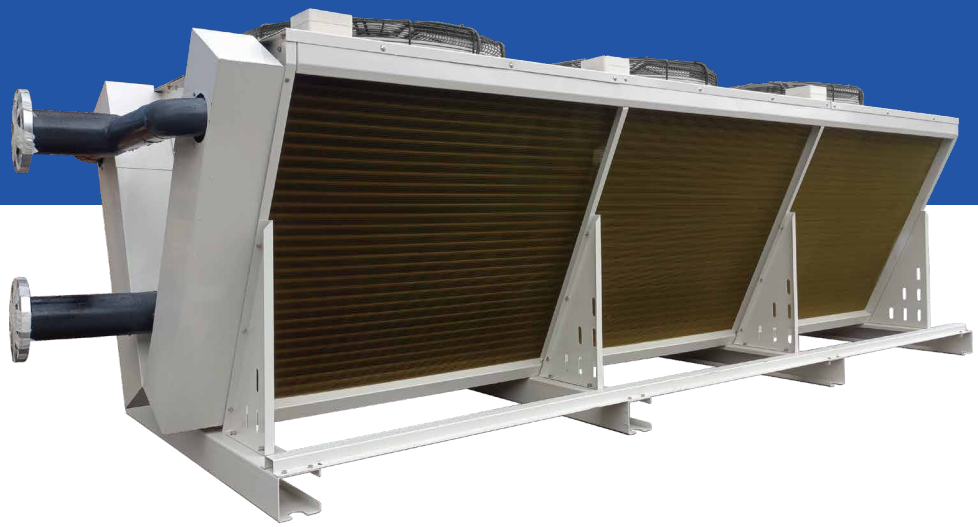
EVER
-HEAT EXCHANGER-

DRY COOLER

PRODUCT MANUAL

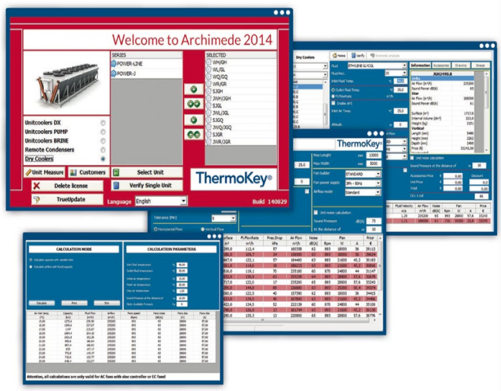
Room 21-22, Floor 7, Veinna building, Chencun, Shunde,
Foshan, Guangdong, China

01 GENERAL INFORMATION



• Product Highlight

Dry cooler



- The dry cooler cools the fluid in the tube by passing the fluid inside the tube and letting natural air flow outside the tube, thereby reducing the temperature of the fluid in the tube to achieve the purpose of cooling.

Compared with the cooling watertower, the dry cooler consumes no water and is a good water-saving components. At the same time, there is no pollution to the environment (recycling should be considered for maintenance).

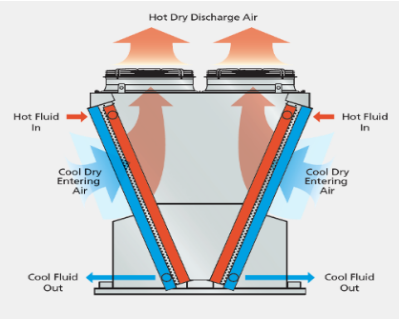
The fluid in the dry cooler is pure water, and ethylene glycol solution is usually added to prevent freezing in the project.

02 WORKING PRINCIPLE

Principle of Operation

Dry cool er

- Hot process fluid enters the inlet header connection, shown in red. Heat from the fluid dissipates through the coil tubes surface to the fins. Ambient air is drawn in over the coil surface by the fan transfer to the air and discharge to the atmosphere. Cool process fluid exists the units through the connections shown in blue.



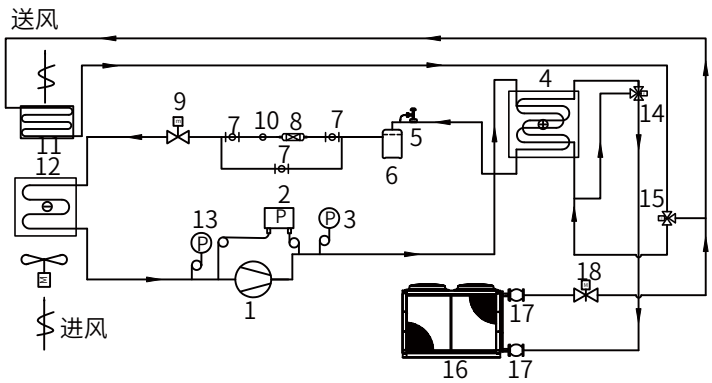
- EC motors are the latest development in energy saving and speed control. The high efficiency wing tip fans operate up to 3db less than conventional blade fans with improved part speed energy consumpt.

Advanced Motor Technology

Zero Maintenance
Intergrated Speed Control

How to reach eco-friendly efficiency?

Dry cooler



序号	名称	序号	名称	序号	名称
1	压缩机	7	球阀	13	低压表
2	高低压控制表	8	干燥过滤器	14	电动三通阀1#
3	高压表	9	电磁阀	15	电动三通阀2#
4	冷凝器	10	潮气指示灯	16	室外干冷器
5	安全阀	11	自由冷却盘管	17	软接驳
6	储液罐	12	蒸发器	18	电动水阀

03 APPLICATIONS

Data Center

Mechanical cooling

Building Automation System

Hospital and Labs

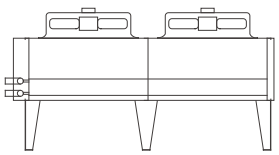
Power Plant

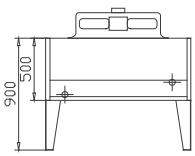
HVAC

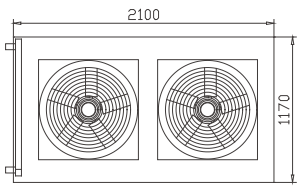
04 PRODUCTS

1. P Type Horizontal version

Dry cooler







Units with horizontal airflow of economical application for commercial and industrial use.

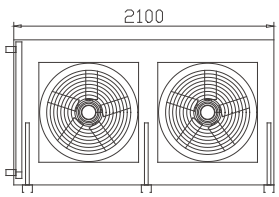
Features:

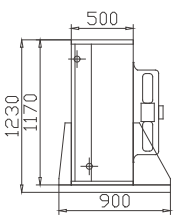
1.Piping in copper or stainless steel AISI 304 Or of material AISI 316LFinned pack available in a wide ranges.

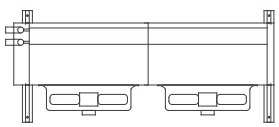
2. Fans: AC and EC
3. Complete range of accessories.
4. Casing in galvanized steel, powder painted.

2. P Type Vertical version

Dry cooler







Units with vertical airflow dry coolers with Evaporative pre-cooling and Water- and energy-saving solution.

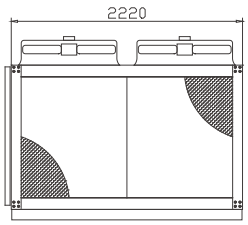
Features:

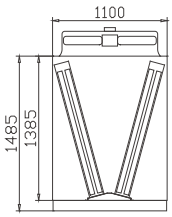
1.Piping in copper or stainless steel AISI 304 Or AISI 316LFinned pack available in a wide range of materials.

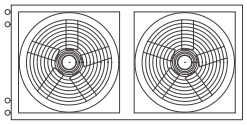
2. Fans: AC and EC
3. Complete range of accessories.
4. Casing in galvanized steel, powder painted.

3.V Shape version (single module)

Dry cooler







V-shaped designs, featuring incre ase theareaof the int ake.
evaporative pre-coolingoption for inst antenergy savings.

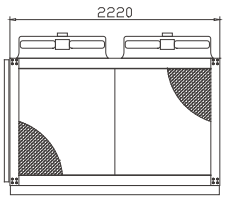
Features:

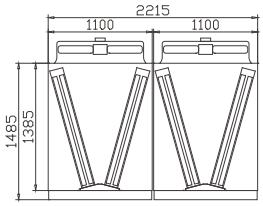
1.Piping in copper or stainless steel AISI 304 Or AISI 316L Finned pack available in a wide range of materials.

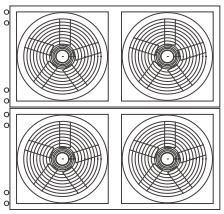
2. Fans: AC and EC
3. Complete range of accessories.
4. Casing in galvanized steel, powder painted.

4.V shape version(double modules)

Dry cooler







High-performance V-shaped dry coolers with Evaporative pre-cooling, spray system and dust filter.

Features:

1.Piping in copper or stainless steel AISI 304 Or AISI 316L Finned pack available in a wide range of materials.

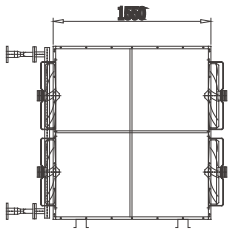
2. Casing in galvanized steel, powder painted

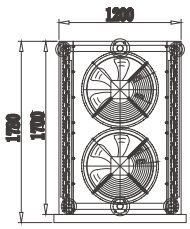
3. Fans: AC and EC

4. Complete range of accessories.

5.Double Panel Vertical Version

Dry cooler





Dry coolers for refrigeration, air conditioning, and process applications in V-shaped designs. Suitable for water, glycols and special fluids.

Features:

1.Piping in copper or stainless steel AISI 304 Or AISI 316L Finned pack available in a wide range of materials.

2. Fans: AC and EC

3. Complete range of accessories.

4. Casing in galvanized steel, powder painted.

05 PRODUCT DATAS

Technical Data Of Dry Cooler-P type									
Model	Air Flow (m^3/h)	Heat Capacity (kW)	Water Flow (l/s)	Fan Size (mm)	Fan Unit (pcs)	Motor Power (kW)	Unit dimensions (mm)		
							L	W	H
AC Fan									
EVER-0101P-3R-AC630	8300	24.87	1.21	630	1	0.74	1000	980	880
EVER-0101P-4R-AC630	8800	29.26	1.44	630	1	0.74	1000	980	900
EVER-0101P-3R-AC710	11000	32.47	1.57	710	1	1.23	1150	1100	880
EVER-0101P-4R-AC710	11500	38.02	1.86	710	1	1.23	1150	1100	900
EVER-0102P-3R-AC630	16600	50.36	2.43	630	2	1.48	1950	980	880
EVER-0102P-4R-AC630	17600	58.53	2.86	630	2	1.48	1950	980	900
EVER-0102P-3R-AC710	22000	66.94	3.23	710	2	2.46	2250	1100	880
EVER-0102P-4R-AC710	23000	76.24	3.71	710	2	2.46	2250	1100	900
EVER-0103P-3R-AC630	24900	75.65	3.66	630	3	2.22	2900	980	880
EVER-0103P-4R-AC630	26400	86.33	4.2	630	3	2.22	2900	980	900
EVER-0103P-3R-AC710	33000	99.86	4.82	710	3	3.69	3350	1100	880
EVER-0103P-4R-AC710	34500	114.11	5.54	710	3	3.69	3350	1100	900
EVER-0104P-3R-AC630	33200	102.35	4.95	630	4	2.96	3850	980	880
EVER-0104P-4R-AC630	35200	116.53	5.68	630	4	2.96	3850	980	900
EVER-0104P-3R-AC710	44000	134.91	6.52	710	4	4.92	4450	1100	880
EVER-0104P-4R-AC710	46000	153.86	7.48	710	4	4.92	4450	1100	900

Note: The above working conditions are based on 42℃/47℃ inlet/outlet temperature, the medium is pure water, ainlet air temperature is 30℃. If the actual working conditions are different from the reference working conditions, please contact the relevant HVAC engineers for selection.

Technical Data Of Dry Cooler-V type									
Model	Air Flow (m^3/h)	Heat Capacity (kW)	Water Flow (l/s)	Fan Size (mm)	Fan Unit (pcs)	Motor Power (kW)	Unit dimensions (mm)		
							L	W	H
AC Fan									
EVER-0102V-3R-AC710	16600	72.42	3.50	710	2	1.48	1850	1100	1060
EVER-0102V-4R-AC800	17600	132.96	6.42	800	2	1.48	2050	1100	1350
EVER-0102V-4R-AC910	22000	165.27	7.98	910	2	2.46	2250	1100	1450
EVER-0202V-3R-AC710	46000	145.05	7.01	710	4	4.92	1850	2200	1060
EVER-0202V-4R-AC800	33200	266.42	12.86	800	4	2.96	2050	2200	1350
EVER-0202V-4R-AC910	35200	330.84	15.97	910	4	2.96	2250	2200	1450
EVER-0203V-3R-AC710	66000	217.68	10.70	710	6	7.38	2750	2200	1060
EVER-0203V-4R-AC800	69000	398.92	19.32	800	6	7.38	3050	2200	1350
EVER-0203V-4R-AC910	49800	495.56	23.89	910	6	4.44	3350	2200	1450
EVER-0204V-3R-AC710	70400	289.89	14.12	710	8	5.92	3650	2200	1060
EVER-0204V-4R-AC800	88000	531.97	25.84	800	8	9.84	4050	2200	1350
EVER-0204V-4R-AC910	92000	662.20	32.08	910	8	9.84	4450	2200	1450
EVER-0205V-3R-AC710	83000	362.15	17.36	710	10	7.40	4550	2200	1060
EVER-0205V-4R-AC800	88000	664.36	32.84	800	10	7.40	5050	2200	1350
EVER-0205V-4R-AC910	110000	826.59	40.12	910	10	12.30	5550	2200	1450

Note: The above working conditions are based on 42℃/47℃ inlet/outlet temperature, the medium is pure water, ainlet air temperature is 30℃. If the actual working conditions are different from the reference working conditions, please contact the relevant HVAC engineers for selection.

06 SHOPPING GUIDE

Dry Cooler Selection: What do you want to know?

Dry cooler selection seems straight forward, and it generally is – until up-to-day customer requirements like optimized power consumption, reduced sound emission, or size limitations are taken into account in detail. Given the wealth of technical solutions for fans, heat exchangers, and assisting components like adiabatic pre-cooling, the task becomes even more complicated. Indeed, what should be taken into consideration when selecting a dry cooler for the modern and efficient cooling plant?

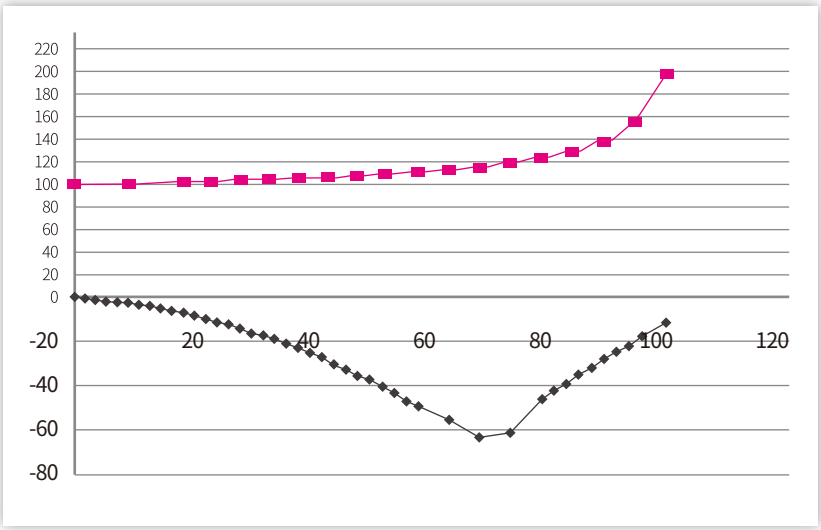
1.Baselines

- fluid inlet temperature, outlet fluid temperature (or flow rate), type of fluid to cool, and ambient air temperature. However, a number of other parameters and conditions should be considered:
- Unit collocation. Closely spaced units will likely have reduced performance.
- wind direction and wind speeds. As strong winds may significantly affect performance
- Altitude above sea level of the installation site affects fan performance.
- Fans shall be selected to withstand the temperature of air exhausted from heat exchangers.
- Antifreeze to prevent the heat exchanger and pipes from freezing, and it is recommended to select AC
- Driven fans to operate at very low ambient temperatures . Fan noice : A good practice is to select EC-driven fans to reduce noise output.
- It is worth assessing expected daily/seasonal changes in cooling demand when selecting fan motor type.
- Type of fan speed controls and regulating signals.
- It may be necessary to introduce dry cooler controls to the upper-level BMS system. So the Type of network protocol should be taken into consideration for controls opyion selection.
- Available water side pressure drop. Excessive pressure drop could lead to pump size and power draw increase.
- Fan blowers can be equipped with individual switch-offs for hot swapping or maintenance without the necessity of unit shutdown.
- Type of fluid connection.
- Type of vibration damper.

2.Process Fluids

- Typical process liquids include water, mixtures of water and glycols, and oils/special fluids.
- The specific heat capacity of water is 4.2kj/kg·. Unless there are special circumstances, water is the most suitable heat transfer medium for dry coolers.
- The mixtureof water and glycolcan prevent thefluid inthecoilfrom freezing under extremeoperating conditions.(below 0°C)

Glycol & Water Freezing and Boiling point：



- It's recommended that the glycol concentration be added up to 50%

Ethylene glycol concentration reference

体积分数（%）	质量分数（%）	起始凝固点 tf/℃	沸点 t/℃ (100.7kPa)
0.0	0.0	0.0	100.0
4.4	5.0	-1.4	100.6
8.9	10.0	-3.2	101.1
13.6	15.0	-5.4	101.7
18.1	20.0	-7.8	102.2
19.2	21.0	-8.4	102.2
20.1	22.0	-8.9	102.2
21.0	23.0	-9.5	102.8
22.0	24.0	-10.2	102.8
22.9	25.0	-10.7	103.3
23.9	26.0	-11.4	103.3
24.8	27.0	-12.0	103.3
25.8	28.0	-12.7	103.9
26.7	29.0	-13.3	103.9
27.7	30.0	-14.1	104.4
28.7	31.0	-14.8	104.4
29.6	32.0	-15.4	104.4
30.6	33.0	-16.2	104.4
31.6	34.0	-17.0	104.4
32.6	35.0	-17.9	105.0
33.5	36.0	-18.6	105.0
34.5	37.0	-19.4	105.0
35.5	38.0	-20.3	105.0
36.5	39.0	-21.3	105.0
37.5	40.0	-22.3	105.6
38.5	41.0	-23.2	105.6
39.5	42.0	-24.3	105.6
40.5	43.0	-25.3	106.1
41.5	44.0	-26.4	106.1
42.5	45.0	-27.5	106.7
43.5	46.0	-28.8	106.7
44.5	47.0	-29.8	106.7
45.5	48.0	-31.1	106.7
46.6	49.0	-32.6	106.7
47.6	50.0	-33.8	107.2
48.6	51.0	-35.1	107.2
49.6	52.0	-36.4	107.2
50.6	53.0	-37.9	107.8

To select an ethylene glycol solution in an appropriate proportion for cold areas.

Thermal Oil

- Its heat dissipation effect is not as good as that pure water and ethyleneglycol. Therefore we do not recommend using thermal oil as the process fluid of the direct dry cooler.

- Another solution adopted by our company ' s comprehensive evaluation: using oil-to-water heating plate replacement.

Oil-to-water Heating Plate

- Add an oil to water plate in the middle of the two different media. As an auxiliary heat dissipation accessory, it has the advantages of high temperature resistance, high heat transfer efficiency, simple structure and easy cleaning.

Special Fluid

- Use inhibitors to prevent heat exchanger corrosion problems.

3. High Efficiency Fan

Fan Speed Control

- Fan regulation is a crucial issue, as, in fact, dry coolers are designed for maximum conditions – maximum ambient temperature and thermal load. Fan regulation helps to reduce oversizing whilst contributing to energy savings and noise levels of the fan motors.

Several solutions for fan speed regulation:

AC-motor fans

- **1. Fans w/elect ronically-commutated (EC) motors**

EC fans offer maximum energy savings compared to other solutions, but the cost of the fan drive is higher than that for fans equipped with conventional AC motors.

- **2. On- off control**

It ensures considerable power savings and reduces noise output but has adversely affect its service life after frequent switching of the fan.

- **3. Frequency converter speed control**

It ensures considerable power savings and reduces noise output but has a downside in magnetic noise.

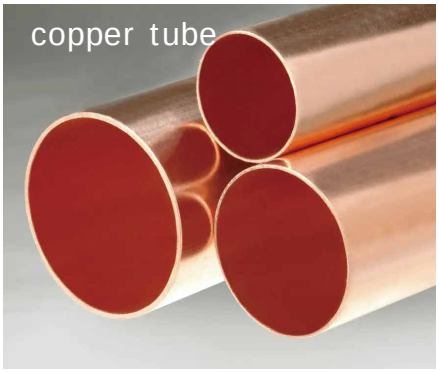
EC- motor fan

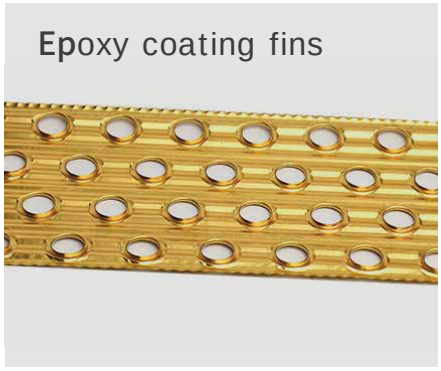
- **4. Sound Emission**

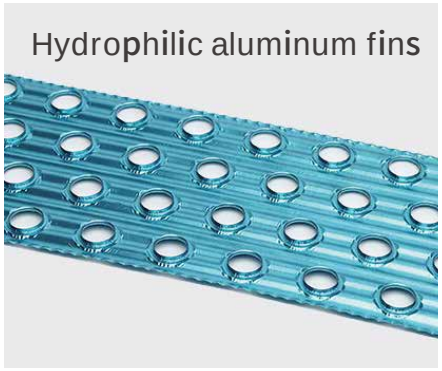
EC-motor fans with regulated speed produce less noise at partial loads, e.g., at nighttime.

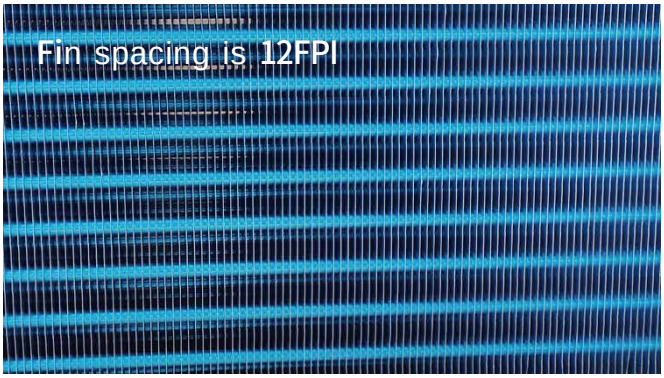
- Beyond those, fan noise can be reduced with the use of diffusers, which, what is more, are increase the system efficiency.

4.Heat Exchanger









1. Copper and Aluminum Tubes and Fins

Large industrial dry coolers generally use finned pack coils made of copper (tubes) and aluminum (fins), while can offer more options on S.S. for superior corrosion resistance and longevity for your choice.

Tube dia. we have ø15.88 and ø12.7 for your choice. Fins spacing is 12FPI is the most reasonable.

2 . Meets ASM EB31.5 piping code

3. Type 304L stainless steel coil construction optional

4. Epoxy coating on fins optional

Corrosion is one of the main problems affecting heat exchangers and is the most common cause of failure. Attention should be paid to corrosion protection of cooling coils, particularly in coastal installations and installations in industrial/ urban areas with high air pollution levels, and we have a wide range of protective coatings available.

5.Adiabatic-Assisted Cooling

• Water Spray Systems

The water spray system provides an adiabatic cooling effect using intermittent atomized water spray on the inlet air stream, lowering air temperature closer to wet-bulb temperature, thus contributing to considerable energy savings and increased duty. The spray system requires water treatment; sprayed water cannot be collected for reuse, making this type of adiabatic pre-cooling water-intensive.

• Evaporative Pre-Cooling

It is more suitable for areas with relatively scarce water resources and dry deserts. It can not only provide heat exchange efficiency, but also save a lot of water resources.

6.Mainteinance

- Although dry cooler is built for minimal service downtime, periodic preventative maintenance is required to ensure maximum reliability, safety, and operating efficiency.
- Dry cooler is rather low-maintenance equipment, there are some basic/key maintenance considerations.
- Ensure that the equipment is accessible(minimum cleanrances are maintained). Check the fan for excessive vibration, visual inspection for corrosion.
- Maintain clean air-side coils surfaces: Make sure to clean coils from cobweb, dust, leaves ect. Heavier dirt must be removed using a pressurized water/steam jet washer. Any cleaning solution should be suitable for tube and fin materials and coatings. It must be noted that improper use of cleaning agents can be corrosive to heat exchanger materials. .
- Check the fluid leaks in heat exchangers and connection.
- Check whether the electrical connections are tight and check the fan current consumption.
- Check control equipment and probes.

Tips:

- Only qualified properly trained personnel should attempt to perform respective maintenance tasks.