

● 中、英文版

**Snowkey**

SERIES SEC EVAPORATIVE  
CONDENSER

SEC 系列蒸发式冷凝器

**Snowkey**

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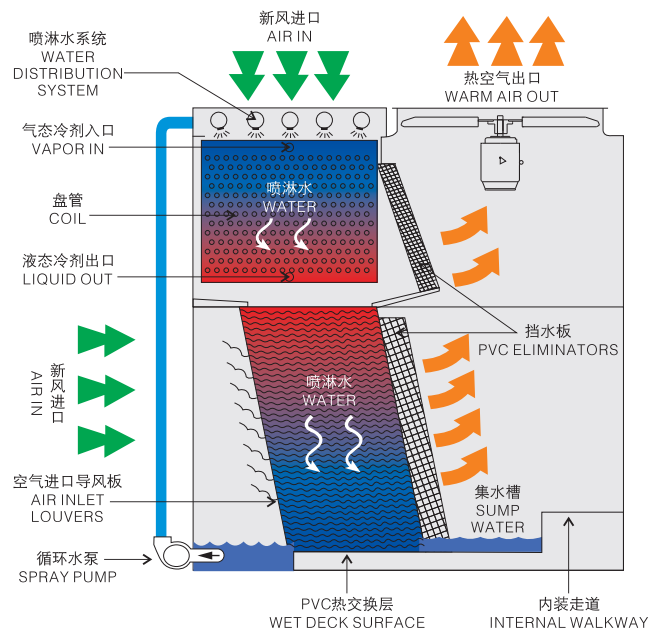
People-oriented,\*  
Science and technology  
For the first \*

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## SEC系列运行原理图

### SEC Series Principle of Operation



## 运行原理

### Operating Principle

盘管内的高温气态制冷剂与盘管外的喷淋水和空气进行热交换，由气态逐渐被冷凝为液态。引风机的超强风力使喷淋水完全覆盖在盘管表面，水借风势，换热效果显著提高。喷淋水和空气吸收热量后温度升高，部分水由液态变成水蒸气，蒸发潜热带走大量的热，热空气中的水被挡水板截住收集到PVC热交换层中。PVC热交换层中的水被流过的空气冷却，温度降低，进入集水槽中，再由循环水泵送入喷淋水系统中，继续循环。散失到空气中的水分由水位调节器控制补充。部分设备的容量，可以根据负荷的大小，由不同的电机转速或不同的风机电机组合来控制。

Hot gaseous refrigerant in the coil exchanges heat to spray water and air outside the coil, being cooled into liquid. The draught fan produces extra forced air that enables spray water to cover the coil surface thoroughly, thus resulting in remarkable improvement in heat-exchange performance. While spray water and air absorbs heat, the water partly turns into vapor due to its increased temperature. Therefore, a great deal of heat is taken off by the latent heat of vaporization. Water out of the heated air is baffled to the PVC heat-exchange fill. Cooled by air crossing the PVC heat-exchange fill to, water flows into the water sump where it is pumped to the spray system for repeating circulation. A water level controller is designed to control the water makeup for water dispersed into surrounding air. The capacity of the evaporative condensers can be adjusted by variable motor speed or different combination of air fan and motor based on actual demand for load.

## SNOWKEY先进的专利技术、卓越的热交换和机械性能

### Advanced patented technology, Classic heat exchange and mechanical performance

**可靠的性能** 二次换热设计的创新组合。

Reliable performance

Innovative combination of twice heat-exchange design.

**常年高效蒸发式冷凝** 风扇安装在高于喷淋水区域的热空气流中。

High efficiency of evaporative condensing all year round. The fan is installed in the hot airstream above the spraying water areas.

**不易结垢** 减少维护次数，保持较好换热性能。

Less scale or dirt

Less maintenance demand to maintain and good performance of heat exchange.

**延长维护周期** 采用了不堵塞的进风导风板和易检修的大直径的水喷淋系统。

Extended maintenance period

Adopt non-clog air inlet louvers and easy maintenance water spraying system in big diameter.

**宽敞的空间** 容易检修维护风机直连驱动系统、换热盘管和水盘。

Spacious room

Provides easy maintenance of fan drive system, heat transfer coil and cold water basin.

**盘管接头少，制冷剂重注量少** 设备重量轻 减少安装费用。

Fewer coil connections, less recharge of refrigerant Light plant, low installation cost.

## 产品特点

### Features

### 维护特点

#### Superior Maintenance features

SEC产品采用了许多独特且实用的设计。宽敞的内部空间设计消除了以往蒸发式冷凝器内部狭窄不易检修的弊病。由于SEC产品是数十年运行经验基础上设计出来的，所以保证了其既耐用又易于维护。

The SEC adopts unique and particle design. The design of spacious room inside eliminates the shortcoming of not easy to examine and repair due to crowded room of the evaporative condenser inside. The SEC design builds upon decades of operation experience, incorporating components that are proven to be durable and



### 可直接检修的水喷淋系统

#### Directly Examinable and repairable Water Spray System

SEC产品的风水同向设计使喷淋系统直接露在外面，当运行时也能简单快速的检修检查喷嘴和盘管。

The parallel air and water flows of the SEC allow the spray area to be uncovered (drift eliminators are inside), permitting quick and easy inspection of the sprays and coils outside the unit while the SEC is in operation.

### 宽敞的无堵塞空气进口导风板

#### Wide-Spaced, Non-clog Air Inlet Louvers

大空间高质量的进风格栅设计，尽可能避免了板面结垢和结冰的可能性。

The spacious and high quality air inlet grid design avoids the possibility of forming scale and ice on the surface.



## 铁链门便于进入检修

### Hinged Access Doors For Easy Entry

设在产品一端的大尺寸检修门使维护人员很容易的进入设备内部。

Big access doors at one end wall provides easy access to the unit inside.

## 方便维护风机驱动系统和冷凝盘管

### Easy Access to Fan Drive System and Condensing Coil

宽大的检修空间可以直接对风机直连驱动系统进行检修。通过易于拆卸的挡水板，也可方便的检查盘管。

A spacious plenum provides easy access to the motor drive system and the condensing coil through easily removable PVC of fans.

## 倾斜的水盘底部清洗方便

### Sloped Basin Floor Facilitates Cleaning

水盘底部向排污口倾斜以及PVC换热层的悬挂设计使得污水和杂质容易被清除。

The floor of the water basin is sloped toward the depressed section and the wet deck is elevated to facilitate flushing dirt and debris from this critical area.

## 投资少

### Lower Investment

SEC型蒸发式冷凝器=壳管式冷凝器+冷却塔+水泵+水池+连接水管

SEC Evaporative Condenser = Shell & Tube Type Condenser + Cooling Tower + Water Pump + Water Sump + Piping

由于SEC系列蒸发式冷凝器机组本身拥有水泵，集水槽和PVC热交换层（与冷却塔类似），结构紧凑、占地小、重量轻、安装方便——可以大大降低现场工程安装量，降低安装费用；SEC系列蒸发式冷凝器采用上下两体标准组装方式，在现场只需将上下两体用螺栓连接，然后再把制冷系统管路、电路系统连接上，即可使用。大大降低了现场安装费用。综上所述，相对于其他形式冷凝器而言，采用SEC系列蒸发式冷凝器的初投资低。

The SEC Evaporative Condenser, with water pump, water sump and PVC heat-exchange fill(has the similar with cooling tower), creates compact structure, less floor space, low unit weights, and convenient installation—that means substantial reduction in installation cost. Moreover, the SEC Evaporative Condenser is delivered to site in the modular assemblies of the upper and lower pares, requiring only bolting the upper and lower casings, and electrical and piping service for use that results in far less on-site installation work and therefore installation cost greatly reduced. In short, the budget of capital expenditure can be curtailed by selecting SEC Evaporative Condensers, compared with other types of condensers.



## 运行效果好 运行费用低

### Excellent Operation effect and Lower Operating Cost

SEC系列蒸发式冷凝器效率高；节水、节电、节占地；需要维护的零部件少；所以比其他形式冷凝器更为经济有效。

Because of its high efficiency, water and electrical savings, and fewer parts to be maintained, the SEC Evaporative Condenser in your application leads to lower operating cost than other types of condensers.

## 质量优良的构造

### Construction Details

### 高强度的结构

#### High strength structure

SEC系列蒸发式冷凝器是在严格的质量控制条件下由标准零部件组装而成的，从而确保每台蒸发式冷凝器都能达到同样的生产质量水平。

SEC系列蒸发式冷凝器的外面板和结构部件均采用耐腐蚀性强的镀锌钢板。在组装设备之前，所有材料的焊接处均涂上富锌漆。这种标准的防腐措施将在应用中提高可靠的保护和较长的使用寿命。

The Series SEC Evaporative Condenser is factory-assembled from standardized parts manufactured under closely-controlled conditions to ensure each unit is built precisely according to the same high-quality construction standards.

All steel panels and structural elements of the SEC are high anti-corrosive galvanized steel. All cut edges have a zinc rich primer applied before assembly. This standard corrosion protection system will provide reliable protection and long life for

## 冷凝盘管

### Condensing Coil

蒸发式冷凝器盘管嵌在高强度镀锌钢板上，拆卸方便。冷凝盘管由高质量的钢管制成，设计压力为2.0Mpa，盘管在水中经2.5Mpa的气密集实验，装配完后经整体热浸锌处理。盘管沿制冷剂流向倾斜便于液体排出，盘管压力降低。

盘管也可选用不锈钢或铝合金材质制成，以便于冷却介质与标准的镀锌钢板材质不相容时使用。

The condensing coil is factory-assembled from high-quality steel tubing. The condensing coil has a design pressure of 2.0Mpa. It is tested by an encircling eddy current system and also at 2.5Mpa air pressure under water. The coil is designed with sloping tubes for free drainage of the condensed liquid. The coil is encased in a steel framework and the entire assembly is hot-dip galvanized after fabrication.

Coils are also available in stainless steel and aluminum in case it's not compatible with the standard galvanized steel construction.



## PVC热交换层

### Cross Wet Deck Surface(Patented)

经设计、测试、制造的一种高效聚乙烯（PVC）热交换层是SEC系列蒸发式冷凝器关键部件，PVC热交换层能有效地防止生化腐蚀和侵蚀；公司设计的独特的挡水板结构能保证最大的水和空气接触和较小的空气压降，使用小功率电机就可确保高效传热。

An efficient polyvinyl chloride(PVC)wet deck surface designed, manufactured, and tested by, is an integral component of the Series SEC Evaporative Condenser's innovative heat transfer system. The wet deck surface is impervious to rot, decay, biological attack. Series SEC Evaporative Condenser utilize the SNOWKEY-developed high efficiency SNOWKEY Wet Deck Surface with Integral Eliminators which provides maximum air/water contact time and low air pressure drop to ensure efficient heat transfer with minimum fan power requirements.



## 水分配系统

### Water Distribution System

水在由液态变成气态时，蒸发潜热会带走大量的热；为了获得最大的传热系数，并减少水垢，必须使整套盘管组件完全沉浸在流水中。水分配系统是完成以上作用的又一关键部件。水盘中的水在水泵的作用下，沿着抗腐蚀的PVC水路系统，通过喷淋支管上的大直径防堵设计、超大流量的喷嘴均匀的喷洒在盘管组件上，在引风机的作用下，最大限度的包住冷凝盘管，使水、空气与制冷剂进行充分的热交换。喷淋支管和喷嘴采用扣式橡胶环管连接，有利于拆卸或冲洗喷嘴和整个支管。



The water absorbs a large amount of heat while shifting from liquid to vapor. In order to acquire the biggest heat conducting coefficient and reduce scale, all the components of coils should be immersed in the flowing water. To achieve the above effect, the water distributing system is one of the key components. With the help of water pump, the water in the distributing pan evenly sprays on the coils through the anti-corrosive PVC water system under the jam preventing design of spraying branch pipe of large diameter to ensure that the water and air exchange the heat with the refrigerant abundantly. The spraying branch pipes and nozzles are connected by rubber grommet which is convenient for disassembly and cleaning.

## 挡水板

### Water Eliminators

挡水板由耐腐蚀的PVC材料制成，分组安装在SEC型蒸发式冷凝器内，拆卸方便，挡水板使空气流动方向经过三次改变后，可有效地去除从盘管中出来的湿空气中的水分，水的飘逸率小于0.001%。

Constructed of PVC and furnished in easily removable sections for quick access to the coil section, the impart three distinct changes in air direction to effectively strip moisture from the air stream leaving the coil with minimum air resistance.

## 风扇机械部件

### Fan Mechanical Components

SEC型蒸发式冷凝器的又一关键部件风机采用耐腐蚀的铝合金中空注塑叶片组成。风机安装在具有流线型入口的风筒内，空气通过风筒排出，顶部余隙容积小，较大的提高了风机效率。

风机驱动系统采用与电机直连的方式，减少了能量损失，维护检修方便。



Heavy duty, aluminum axial-flow fans have been selected to achieve very low fan motor horsepower which are made by anti-corrosive, aluminum alloy. The air discharged through fan cowls designed for stream-lined air entry and minimum tip clearances for maximum fan efficiency. The fan motor driving system is directly connected with motor, which reduces energy loss and facilitates maintenance and repair.

### 水分配系统

#### Water Distribution System

- 可直视和易于检修，没有狭窄空间的限制
- 交叉水喷淋排列确保水能覆盖盘管表面
- 大直径360° 喷嘴防堵塞设计
- Visible and easy maintenance without the limit of crowded room
- Overlapping spray patterns ensure proper water coverage
- Large-diameter, 360° spray nozzles prevent clogging

### 冷凝盘管

#### HDGAF Condensing Coil

- 2.5Mpa的气密性实验
- 换热管采用日本大佑（中国生产）材料
- 接管数量是其他同样大小设备的1/2
- 可选用不锈钢或铝合金材质
- Pneumatically tested at 2.5Mpa
- 0.06" nominal tube wall thickness
- Connection quantity is typically 1/2 that of other similar size units
- Stainless steel or aluminum alloy Available

### 水盘

#### Basin

- 换热层悬挂，水盘倾斜便于清洗
- 耐腐蚀性强的镀锌钢板结构
- 可选择304号不锈钢
- Sloped basin below elevated wet deck facilitates cleaning
- Corrosion resistant galvanized steel construction
- SUS 304 stainless steel basin available

### 整体水泵

#### Integral Water Pump

- 采用机械密封和TECO电机的离心水泵
- Close-coupled, bronze fitted centrifugal pump with mechanical seal and TECO motor

### 带挡水板的换热层

#### Wet Deck Surface with Integral Drift Eliminators

- PVC材料
- 耐腐蚀耐生物侵蚀
- 悬挂在水盘上方，便于清洗
- Polyvinyl chloride (pvc)
- Impervious to rot, decay, or biological attack
- Elevated above basin floor to facilitate cleaning

### 空气进风导风板

#### Air Inlet Louvers

- 较宽间距减少堵塞易于清洗
- 可以移动
- Widely spaced to eliminate louver plugging and facilitate cleaning
- Removable for unhampered access

### 诱导通风

#### Induced Ventilation

- 减少渗漏
- 减少风扇冻冰
- 减少回流
- Minimizes possible water leaks
- Diminishes potential for fan freeze-ups
- Reduces recirculation risk

### 低功耗轴流风机

#### Low-HP Axial Fans

- 高效轴流风扇设计
- 防腐的铝合金中空塑材料，可调角度
- Efficient axial fan design
- Corrosion resistant

### 防腐箱体

#### Corrosion-Resistant Construction

- 高规格镀锌板
- Heavy gauge galvanized steel



### 检修门

#### Hinged Access Doors

- 向内旋转的门
- 安装在设备端面
- Easy-latch, Inward swinging doors
- Located on booth endwalls

### 挡水板

#### Drift Eliminators

- 有效去除排出的空气中的水分
- 耐腐蚀PVC材料
- 可移动的设计能检修盘管
- Efficiently remove entrained moisture from leaving air stream
- Anti-corrosive polyvinyl chloride (PVC)
- Removable sections permit quick access to the coil section

## 减少结垢的设计 Reduced Scale Design

和传统的冷凝器比较，SEC蒸发式冷凝器四个方面因素减少结垢的可能。

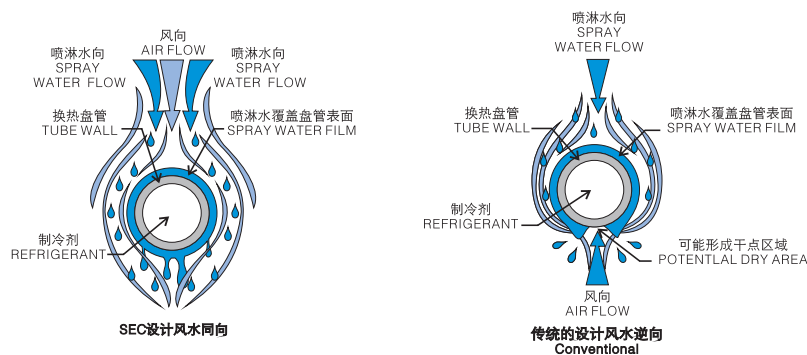
Four facets of the SEC Evaporative Condenser work together to reduce the propensity for scale build-up when compared with conventional condensers.

### 1、风水同向

由于空气和喷淋水在同一方向流过冷凝管，喷淋水能很好地覆盖在盘管表面，保持钢管表面完全湿润。这种同向流动减少因为风水逆向而在钢管下面形成干点而结垢的可能。

#### 1. Air and Water Flow in Parallel Path

Better water coverage around the tubes is due to air and spray water flowing in a smooth, paralleled, downward path over the condensing coil, maintaining full tube coverage. This parallel flow eliminates scale-promoting dry spots since the water is not stripped from the underside of the tubes by the airflow.



### 2、加大流过盘管表面的水量

SEC流过盘管表面的喷淋水流量是大多传统蒸发式冷凝器的两倍，这保证在换热表面有连续水流从而减少结垢的可能，SEC蒸发式冷凝器特有的热转换系统能够使水泵在较大的水流下而不需增加功率。

#### 2. Increased Water Flow over Coil.

The spray water flow rate over the coil is twice that of most conventional evaporative condensers. This provides continuous flooding of the primary heat transfer surface for decreasing scaling potential. No increase in pump horsepower is required while this higher flow due to the SEC's unique heat transfer system.

### 3、主要在湿润的表面上蒸发

SEC产品在换热表面应用湿流技术。主要换热表面，冷凝盘管是蒸发式冷凝器最重要的部件。由于SEC盘管表面是显热和潜热换热，和其他通过盘管表面只依靠显热换热的设计相比，SEC盘管表面不易结垢。

#### 3. Evaporation Occurs Primarily in Wet Deck.

The SEC incorporates combined-flow technology using both primary and secondary heat transfer surfaces. The primary heat transfer surface, the serpentine condensing coil is the most important as well as the most expensive component in the evaporative condenser. The coil of the SEC is protected from detrimental scale since the SEC coil relies primarily on sensible heat transfer and therefore is less susceptible to scale formation than other designs which rely primarily on latent (evaporative) heat transfer from the coil surface.


### 4、较低水温的喷淋水

较低的水温使结垢的物质更易保留在水中，不沉淀在盘管上。在SEC蒸发式冷凝器中由于增加PVC换热层，喷淋水温通常较其他形式蒸发式冷凝器低4到5℃，SEC蒸发式冷凝器的较低水温能减少25%结垢的可能性。这种结垢减少量也取决于前面讨论的三个方面的因素。

#### 4. Colder Spray Water.

Spray water at colder temperatures has a lower propensity to form scale because scaling compounds remain in solution rather than depositing as solids on the coil. In the SEC, the spray water over the coil is commonly 4–5°C colder than other condenser designs due to the addition of the secondary heat transfer surface. The colder spray water alone typically reduces the scaling potential of the SEC by 25% compared to other designs. This is above and beyond the scale reduction achieved due to the first three facets discussed above.

## SEC机型选型方法 SEC Model Selection



### 蒸发式冷凝器选型软件可以快速选型 Computer Selection Software

请用户提供要选择的蒸发式冷凝器的下列参数，我们将为您选择合适的SEC系列蒸发式冷凝器：

Please provide the following data for a model selection. We will then properly select the series SEC Evaporative Condensers:

设计湿球温度 _____ °C Design wet bulb temperature	制冷剂 _____ Refrigerant
设计冷凝温度 _____ °C Design condensing temperature	排热量 _____ KW Heat rejection
(或者) 压缩机总制冷量 _____ KW Computer evaporator capacity	
压缩机轴功率 _____ KW Computer Bhp input	

## 排热量计算方法 Heat Rejection Method

在机械制冷系统中，蒸发式冷凝器的作用是将热量排到环境中，需排出的热量是在蒸发器中吸收的热量 and 压缩机输入的热量之和。正确地确定蒸发式冷凝器的负荷必须确定压缩机输入的能量和蒸发器吸收的热量。

In a mechanical refrigeration system, the function of an evaporative condenser is to reject heat to the environment. The heat to be rejected is the sum of the heat input at the evaporator and the energy input at the compressor. For a given set of operating conditions, the energy input through the compression process can vary. Therefore, to accurately determine the proper evaporative condenser required, it is necessary to establish the compressor energy input as well as heat absorbed in the evaporator.

表1为每台蒸发式冷凝器的标准排热量。

表2为不同冷凝温度和湿球温度下系统排量的校正系数。

The standard Heat Rejection of each evaporative condenser is shown in Table 1. Table 2 presents correction factors to be applied to the system heat rejection for various condensing temperatures, wet bulbs, and refrigerants.

表1—标准排热量SEC (KW)

Table 1. Standard Heat Rejection

表1—SEC蒸发式冷凝器标准热负荷 (kw)  
Chart 1—Evaporative Condenser Standard Heat Load

型号 Model	热负荷 (kw) Heat load	型号 Model	热负荷 (kw) Heat load
SEC-320	320	SEC-1205	1205
SEC-345	345	SEC-1240	1240
SEC-365	365	SEC-1245	1245
SEC-385	385	SEC-1275	1275
SEC-400	400	SEC-1455	1455
SEC-505	505	SEC-1525	1525
SEC-530	530	SEC-1585	1585
SEC-565	565	SEC-1635	1635
SEC-590	590	SEC-1670	1670
SEC-635	635	SEC-1705	1705
SEC-660	660	SEC-1760	1760
SEC-710	710	SEC-1775	1775
SEC-745	745	SEC-1825	1825
SEC-795	795	SEC-1840	1840
SEC-835	835	SEC-1875	1875
SEC-895	895	SEC-1795	1795
SEC-920	920	SEC-1845	1845
SEC-990	990	SEC-1885	1885
SEC-1035	1035	SEC-1945	1945
SEC-1090	1090	SEC-1960	1960
SEC-1115	1115	SEC-2016	2016
SEC-1135	1135	SEC-2035	2035
SEC-1160	1160	SEC-2075	2075
SEC-1195	1195	SEC-2490	2490

1. 确定系统所需的总排热量；
2. 确定设计条件，冷凝温度和湿球温度；
3. 确定校正系数；
4. 将总的系统排热量乘上校正系数，确定校正排热量；
5. 运用表1选择蒸发式冷凝器，选标准排热量（热负荷）等于或大于第4步计算出的校正排热量。

1. Establish total heat rejection required by the system.
2. Determine the design conditions for condensing temperature and wet bulb temperature.
3. Use the appropriate factor (Table 2), to determine the correction factor to be applied to the system heat rejection.
4. Multiply the correction factor by the total system heat rejection
5. Use Table 1, select the evaporative condenser whose standard total heat rejection equals or exceeds the corrected heat rejection calculated in Step 4.

注意：

型号数字的含义是在使用R717，冷凝温度为35.7℃，湿球温度25.6℃情况下机组的排热量。

Note:

Model number is nominal evaporator tons based on R-717, 35.7℃ condensing temperature, -6.7℃ saturated suction temperature, and 25.6℃ wet bulb temperature.

表2—排热量的校正系数

Table 2. Heat Rejection Capacity Factors

A. 制冷剂R717  
Refrigerant R717

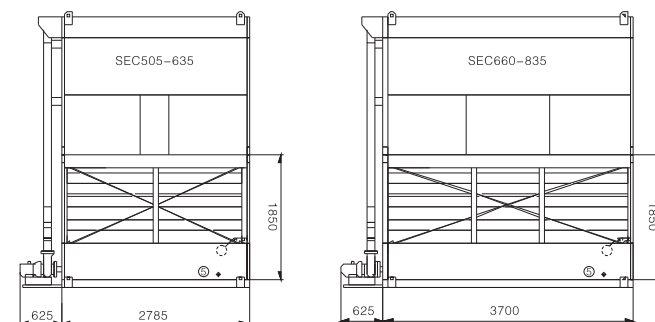
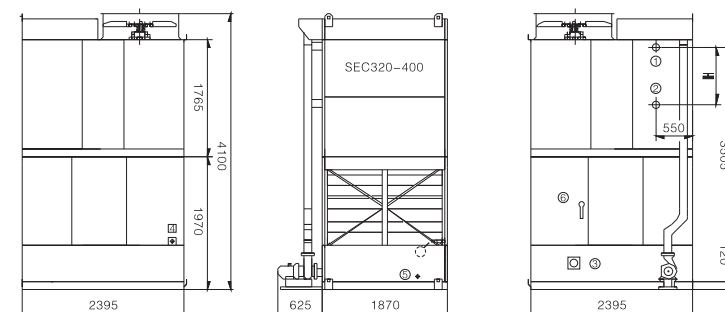
冷凝温度 (℃) Condensing temperature	进风空气湿球温度 (℃) Air inlet wet bulb temperature															
	10	12	14	16	18	19	20	21	22	23	24	25	26	27	28	
29	0.71	0.76	0.84	0.94	1.07	1.16	1.27	1.40	1.57	1.80	2.12	2.61	-	-	-	
30	0.67	0.72	0.76	0.87	0.98	1.06	1.15	1.25	1.39	1.57	1.81	2.16	-	-	-	
31	0.63	0.67	0.73	0.80	0.89	0.95	1.02	1.10	1.20	1.33	1.49	1.71	2.02	-	-	
33	0.56	0.60	0.64	0.69	0.76	0.80	0.85	0.90	0.97	1.05	1.14	1.26	1.42	1.67	1.92	
35	0.51	0.53	0.57	0.61	0.66	0.69	0.72	0.76	0.81	0.86	0.92	1.00	1.09	1.22	1.35	
37	0.46	0.48	0.51	0.54	0.58	0.60	0.63	0.66	0.69	0.72	0.77	0.82	0.88	0.96	1.04	
39	0.42	0.44	0.46	0.49	0.52	0.53	0.55	0.57	0.60	0.62	0.66	0.69	0.73	0.79	0.84	
41	0.39	0.40	0.42	0.44	0.46	0.48	0.49	0.51	0.53	0.55	0.57	0.60	0.63	0.67	0.70	
43	0.36	0.37	0.38	0.40	0.42	0.43	0.44	0.45	0.47	0.49	0.50	0.52	0.54	0.57	0.60	
45	0.33	0.34	0.35	0.37	0.37	0.39	0.40	0.41	0.42	0.43	0.45	0.46	0.48	0.50	0.52	

B. 制冷剂R22和R134A  
Refrigerant R22 & 134A

冷凝温度 (℃) Condensing temperature	进风空气湿球温度 (℃) Air inlet wet bulb temperature													
	10	12	14	16	18	19	20	21	22	23	24	25	26	28
29	0.84	0.92	1.01	1.13	1.29	1.40	1.53	1.70	1.91	2.19	2.59	3.18	-	-
31	0.75	0.81	0.88	0.97	1.08	1.15	1.24	1.34	1.47	1.62	1.83	2.10	2.48	-
33	0.68	0.72	0.77	0.84	0.92	0.98	1.03	1.10	1.19	1.28	1.40	1.56	1.75	2.37
35	0.61	0.65	0.69	0.74	0.81	0.84	0.89	0.93	0.99	1.06	1.14	1.23	1.35	1.68
37	0.56	0.59	0.62	0.66	0.71	0.74	0.77	0.81	0.85	0.90	0.95	1.01	1.09	1.29
39	0.52	0.54	0.57	0.60	0.64	0.66	0.68	0.71	0.74	0.78	0.82	0.86	0.91	1.05
41	0.48	0.49	0.52	0.54	0.57	0.59	0.61	0.63	0.66	0.68	0.71	0.75	0.78	0.88
43	0.44	0.46	0.48	0.50	0.52	0.54	0.55	0.57	0.59	0.61	0.63	0.66	0.68	0.75
45	0.41	0.42	0.44	0.46	0.48	0.49	0.50	0.52	0.53	0.55	0.56	0.58	0.61	0.66

SEC-320—SEC-835型蒸发式冷凝器外形尺寸和技术数据

Model SEC-320~SEC-835 Evaporative Condenser Dimensions and Technical Data



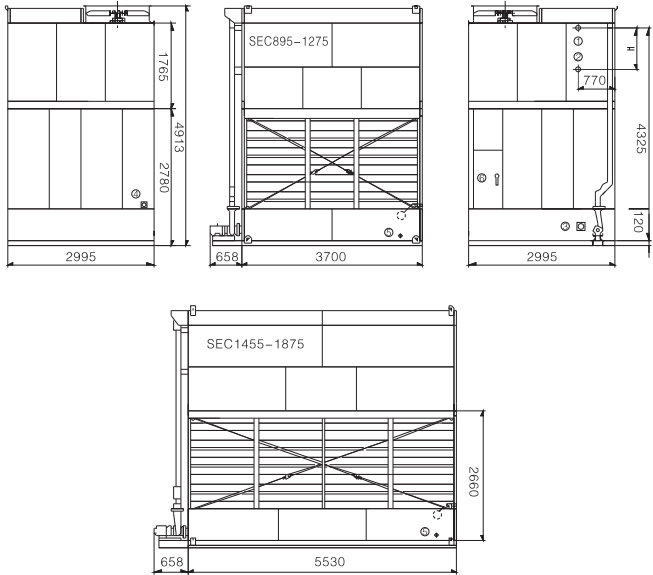
1. 制冷剂入口 DN100
2. 制冷剂出口 DN100
3. 溢流孔 DN80
4. 补水孔 DN25
5. 排水孔 DN50
6. 检修门

1. Refrigerant inlet Dn100
2. Refrigerant outlet Dn100
3. Overflow Dn80

4. Supplement Dn25
5. Drainage Dn50
6. Service door

型 号 Model	热负荷kW Heat load	重 量(kg) Weight			风量 Air Flow Rate m3/min	风机功率 Fan Power kw	水流量 Water Flow L/S	水泵功率 Water Pump Power kw	氟充灌量 R717 kg	H mm
		净重 Net Weight	运行 Operating weight	最重部件 Most Heavy Part						
SEC -320	320	2400	3420	1490	750	4.0	12	1.5	31	850
SEC -345	345	2430	3450	1500	860	5.5	12	1.5	31	850
SEC -365	365	2430	3620	1500	945	7.5	12	1.5	39	850
SEC -385	385	2570	3620	1650	835	5.5	12	1.5	39	1090
SEC -400	400	2570	3630	1660	940	7.5	12	1.5	39	1090
SEC -505	505	3400	5110	2170	1200	3.0×2	18	2.2	47	850
SEC -530	530	3430	5110	2170	1320	4.0×2	18	2.2	47	850
SEC -565	565	3450	5030	2190	1510	5.5×2	18	2.2	47	850
SEC -590	590	3650	5270	2390	1290	4.0×2	18	2.2	58	1090
SEC -635	635	3690	5290	2420	1470	5.5×2	18	2.2	58	1090
SEC -660	660	4190	6320	2620	1540	4.0×2	32	3.7	62	850
SEC -710	710	4220	6340	2640	1770	5.5×2	32	3.7	62	850
SEC -745	745	4230	6350	2650	1930	7.5×2	32	3.7	62	850
SEC -795	795	4520	6680	2940	1720	5.5×2	32	3.7	77	1090
SEC -835	835	4530	6690	2950	1890	7.5×2	32	3.7	77	1090

SEC -895—SEC -1875型蒸发式冷凝器外形尺寸和技术数据  
Model SEC-895 ~ SEC-1875 Evaporative Condenser Dimensions and Technical Data



1. 制冷剂入口 DN100

2. 制冷剂出口 DN100

3. 溢流孔 DN80
4. 补水孔 DN25

5. 排水孔 DN50

6. 检修门
1. Refrigerant inlet Dn100

2. Refrigerant outlet Dn100

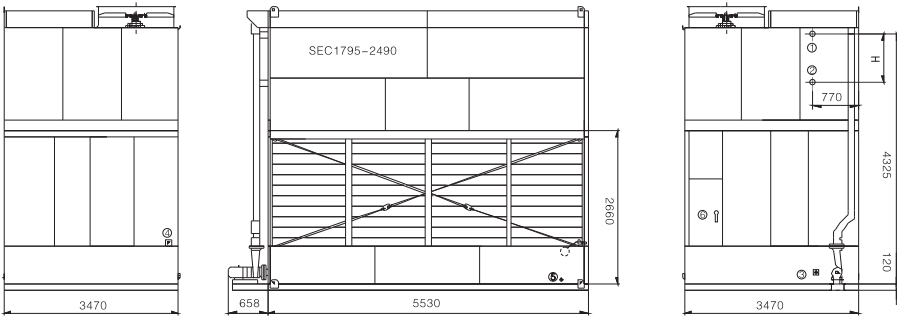
3. Overflow Dn80
4. Supplement Dn25

5. Drainage Dn50

6. Service door

型 号 Model	热负荷kW Heat load	重 量(kg) Weight			风量 Air Flow Rate m3/min	风机功率 Fan Power kw	水流量 Water Flow L/S	水泵功率 Water Pump Power kw	氟充灌量 R717 kg	H mm
		净重 Net Weight	运行 Operating weight	最重部件 Most Heavy Part						
SEC -895	895	4600	7000	2860	2280	7.5×2	45	5.5	70	610
SEC -920	920	4610	7010	2870	2400	11.0×2	45	5.5	70	610
SEC -990	990	5010	7480	3270	1905	5.5×2	45	5.5	92	850
SEC -1035	1035	5010	7480	3280	2100	7.5×2	45	5.5	92	850
SEC -1090	1090	5040	7510	3300	2395	7.5×2	45	5.5	92	850
SEC -1115	1115	5050	7520	3310	2395	11.0×2	45	5.5	92	85
SEC -1135	1135	5890	8490	4150	1905	5.5×2	45	5.5	137	1330
SEC -1160	1160	5450	7980	3720	2035	7.5×2	45	5.5	115	1090
SEC -1195	1195	5910	8510	4170	2035	7.5×2	45	5.5	137	1330
SEC -1205	1205	5480	8010	3740	2190	7.5×2	45	5.5	115	1090
SEC -1240	1240	5930	8530	4190	2190	7.5×2	45	5.5	137	1330
SEC -1245	1245	5490	8020	3750	2330	11.0×2	45	5.5	115	1090
SEC -1275	1275	5930	8530	4190	2290	11.0×2	45	5.5	137	1330
SEC -1455	1455	7110	10840	4700	2875	5.5×3	54	7.5	137	850
SEC -1525	1525	7130	10850	4710	3165	7.5×3	54	7.5	137	850
SEC -1585	1585	7180	10900	4760	3405	7.5×3	54	7.5	137	850
SEC -1635	1635	7190	10910	4770	3620	11.0×3	54	7.5	137	850
SEC -1670	1670	8440	12350	6030	2875	7.5×3	54	7.5	202	1330
SEC -1705	1705	7800	11630	5380	3075	7.5×3	54	7.5	171	1090
SEC -1760	1760	8490	12400	6080	3075	7.5×3	54	7.5	202	1330
SEC -1775	1775	7850	11670	5430	3310	7.5×3	54	7.5	171	1090
SEC -1825	1825	7860	11680	5440	3520	11.0×3	54	7.5	171	1090
SEC -1840	1840	8530	12440	6120	3310	7.5×3	54	7.5	202	1330
SEC -1875	1875	8530	12440	6120	3450	11.0×3	54	7.5	202	1330

SEC -1795—SEC -2490型蒸发式冷凝器外形尺寸和技术数据  
Model SEC-1795 ~ SEC-2490 Evaporative Condenser Dimensions and Technical Data



1. 制冷剂入口 DN100

2. 制冷剂出口 DN100

3. 溢流孔 DN80
4. 补水孔 DN25

5. 排水孔 DN50

6. 检修门
1. Refrigerant inlet Dn100

2. Refrigerant outlet Dn100

3. Overflow Dn80
4. Supplement Dn25

5. Drainage Dn50

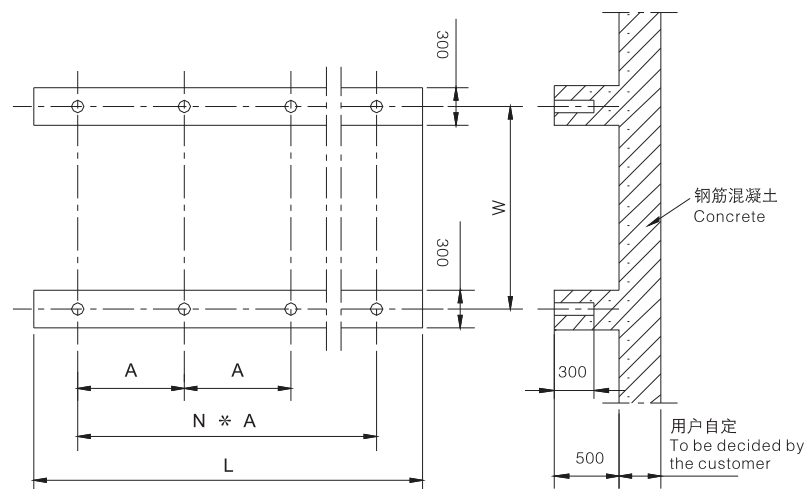
6. Service door



型 号 Model	热负荷kW Heat load	重 量(kg) Weight			风量 Air Flow Rate m3/min	风机功率 Fan Power kw	水流量 Water Flow L/S	水泵功率 Water Pump Power kw	制冷剂充量 R717 kg	H mm
		净重 Net Weight	运行 Operating weight	最重部件 Most Heavy Part						
SEC -1795	1795	8450	13270	5800	3180	5.5×3	54	5.5	183	1090
SEC -1845	1845	9180	14100	6530	3180	5.5×3	54	5.5	217	1330
SEC -1885	1885	8490	13310	6840	3510	7.5×3	54	5.5	183	1090
SEC -1945	1945	9230	14140	6570	3510	7.5×3	54	5.5	217	1330
SEC -1960	1960	8540	13360	5890	3780	7.5×3	54	5.5	183	1090
SEC -2020	2020	8550	13360	5900	4005	11.0×3	54	5.5	183	1090
SEC -2035	2035	9260	14180	6610	3780	7.5×3	54	5.5	217	1330
SEC -2075	2075	9270	14190	6620	3930	11.0×3	54	5.5	217	1330
SEC -2490	2490	10680	16120	7760	4440	11.0×3	54	5.5	278	1760

## SEC -320—SEC -2490型蒸发式冷凝器基础尺寸和技术数据

Model SEC-320~SEC-2490 Evaporative Condenser Dimensions and Technical Data



型 号 Model	尺寸 (mm) Dimensions			地脚螺栓孔数 Footing Bolt Hole	数量 N
	W	L	A		
SEC -320—400	2345	1870	870	4	1
SEC -505—635	2345	2785	1705	4	1
SEC -660—835	2345	3700	1650	6	2
SEC -895—1275	2945	3700	1650	6	2
SEC -1455—1875	2945	5530	2520	6	2
SEC -1795—2490	3420	5530	2520	6	2

## 安装注意事项:

1. 用户施工前应核对机器型号。
2. 浇筑时应保证地脚螺栓的尺寸要正确。
3. 基础承载能力应根据设备运行载荷进行设计。
4. 基础上表面平面误差应小于±5mm。
5. 蒸发式冷凝器进风口应距障碍物1.5米以上。
6. 蒸发式冷凝器的排风口应高于相邻建筑物1米以上。

## Notes for Installation:

1. Please check the model of the machine before construction
2. To ensure the dimensions of the foot bolt is correct when casting.
3. The capacity of base load should be designed according to the plant operating load.
4. The allowable deviation of the surface should be less than 5mm
5. The distance between the air inlet of evaporative condenser and obstacles should be more than 1.5m
6. The air discharge site should be 1m higher than Neighboring constructions.

## 运行注意事项

1. 常年运行情况

常年运行的蒸发式冷凝器，尤其是在寒冷地区，设备安装时必须考虑防冻的问题。

解决方法一：将带喷淋水循环水泵的附加水箱放置于有加热之处，当循环水泵停止运转时，冷凝器水盘的水排入室内水箱，当环境温度低，冷凝负荷小，蒸发式冷凝器干式运行，如冷凝负荷增加，及时开启循环水系统。

解决方法二：设置远置室内不冻水槽，但是必须注意保证水泵吸入压头以及水泵停止后，所有的水能够排出。

解决方法三：如果上述方法受设备安装位置，空间限制，可在冷凝器水盘中安装电加热器，防止水冻结。水槽电加热器，根据用户要求在工厂内安装，位于蒸发式冷凝器底部水槽水位线以下，配备低水位控制器，防止水位过低，电加热器干烧损坏。加热温度由温控器控制，原则为环境温度-18℃时，水槽水温不低于4℃。

## Notes for Operating

1. Operating Situation All Year Round

When installing the condenser, the cold weather should be taken into consideration.

Solution 1: Put the additional water tank of spraying water circulation pump on the heating place. As soon as the water pump stops running, the water in the water pan of the condenser will be discharged to water tank inside. When the temperature of the environment is low, the condensing load is little and the condenser is dry operating. If the condensing load goes up, it will start the circulation water system in time.

Solution 2: Set up a remote indoor non-freezing gutter and make sure that all the water should be discharged out after the water pump stops.

Solution 3: If the above solutions are limited due to installation position or room, install an electrical heater in the water pan of the condenser to prevent water freezing. According to the requirements of customers, the electrical heater of gutter shall be installed under the water level of gutter at the bottom of evaporative condenser. A low water level controller can be used to prevent over-Low water level and avoid damage to the electrical heater due to over-burning. The heating temperature will be controlled by the Temperature controller. In principle, the temperature of the gutter should not be lower than 4℃ when the environmental temperature is -18℃.

型 号 Model	320-400	505-635	660-835	895-1275	1455-1885	1795-2490
电加热 功率kW Electrical heater Power	4	6	8	12	12	16

## 2. 水处理

蒸发式冷凝器运行过程中，随着水分蒸发，溶解在水中的杂质浓度增加，引起结垢和腐蚀；同时，空气中的灰尘，微生物，细菌等进入水循环系统，需要定期清理。采用定期排放可控制结垢与腐蚀，也可与水处理公司联系使用其他水处理方式。循环水应符合《工业循环冷却水处理设计规范》GB50050—95标准，建议循环水的PH值在7-9之间。

## 2. Water Treatment

When the evaporative condenser is operating, the concentration of impurity will increase and thus cause scale and corrosion as the water is vaporizing. Meanwhile, the dust, animalcule and bacterium in the air will go into the water circulation system, which needs cleaning regularly. The regular discharge will control the scale and corrosion. Besides, some water treatment companies can also deal with this problem in other ways. The circulation water should comply with "The Design Code of the Code for Design of Industrial Recirculating Cooling Water Treatment" GB50050-95 Standard. It is recommended that the PH value of the circulating water should be 7-9.

工程应用  
Engineering Applications

蒸发式冷凝器的良好性能取决于选型正确和整个系统的设计得当。以下着重对应考虑的一些主要问题做了说明，并给出了由 SNOWKEY 公布详细说明蒸发式冷凝器的应用、操作和维护的有关报和手册。  
详见 SNOWKEY 蒸发式冷凝器工程手册和 SNOWKEY 操作和维护说明。

Satisfactory evaporative condenser performance is dependent on correct selection and proper attention to overall system design. Some of the major planning considerations are highlighted below, and attention is called to publish in SNOWKEY bulletins and manuals that provide a more detailed treatment of evaporative condenser application, operation, and maintenance. Refer to the SNOWKEY Evaporative Condenser Engineering Manual and the SNOWKEY Operating and Maintenance Instructions for more details.

管路  
Piping

适当的管路对蒸发式冷凝器的成功和经济性运行十分重要。要按制冷的标准惯例适当确定管路尺寸，并在布置时为系统零部件间的膨胀和收缩留出空间。在冷凝器 and 高压贮液器之间必须安装适当尺寸的平衡管线，以防止气体堵塞以及制冷剂回流到冷凝器受阻。为了便于部件维修，还要安装维修阀门。  
在多台蒸发式冷凝器的安装上，不论是并联管壳式冷凝器的蒸发式冷凝器或是具有多个盘管的单个冷凝器制冷剂出口必须带有存液弯接到液体制冷剂总管上。带有存液弯的液体立管必须具有足够的高度，起到平衡不同盘管压力降的作用，防止液体制冷剂回流到冷凝盘管。这种类型的液体管路在不需要手动关闭进出口阀门的情况下仍然可以独立操作。

Proper piping is important to the successful and economical evaporative condenser operation. Piping should be adequately sized according to refrigeration standard practice and to allow flexibility for expansion and contraction and contraction between component parts of the system. Suitably sized equalizing lines must be installed between the condenser and high pressure receiver to prevent gas binding and refrigeration backup in the condenser. Service valves should be installed so that the component parts may be easily maintained.

When multiple evaporative condensers are installed, either evaporative condensers in parallel of shell-and-tube condensers or single condensers with multiple coils, refrigerant outlet connections must be trapped into the main liquid refrigerant header. The trapped liquid legs must be high enough to balance the effect of the unequal coil pressures to prevent from backing up liquid refrigerant into the condensing coil. This type of liquid line piping permits independent operation of any parallel circuit without manually closing inlet and outlet valves.

放空气  
Purging

空气和其他不凝性气体可因以下几种原因集中到制冷系统中：在装料前或维修后排气不良；在压力低于大气压时向系统渗漏以及油和/或制冷剂出现化学分解。  
如果任由这种情况发展，系统中的非制冷物质会产生冷凝压力高，从而使压缩机的功率输入增加。因此在关机时可以从导致系统的高点放空气，或在运行时，从冷凝器出液口和高压贮液器的顶部放空气。  
关于管路和放空气的建议，详见 SNOWKEY 蒸发式冷凝器工程手册。

Air and other non-condensable gases collect in refrigeration systems from several sources: poor evacuation prior to charging or after repairs; a leak into the system if pressures are below atmospheric; and chemical breakdown of oil and/or refrigerant. If permitted to accumulate, non-condensables in the system cause high condensing pressures and, therefore, increased power input to the compressors. Purging can be accomplished during shutting down, from the high point of the system, or during operation, from the top of the condensing coil outlet and high pressure receiver. Refer to the SNOWKEY Evaporative Condenser Engineering Manual for more detailed recommendations on piping and purging.

冷天运行  
Operation Under Cold Weather

在容量控制和防寒适当时，SEC 蒸发式冷凝器非常适合于冷天使用。当 SEC 在冷凝温度为 10℃ 受载运行时，循环水不会结冰。

在冰冻条件下关闭风扇和循环泵时，必须防止水盘水结冰。可以在冷凝器水盘中安装电加热器。在 -17.8 和 -28.9℃ 以上的环境温度和每小时 16.09 公里的风速下可以使用备选加热器。此外在泵的吸水管线、泵、泵的排水管线（达到溢流）以及水的补充管线上应包裹热跟踪元件和隔热层。

The SEC Evaporative Condenser is well suited for cold weather applications when used with proper capacity control and under proper freeze protection. When the SEC is operating under load with a minimum condensing temperature of 10℃, the recirculating water will not freeze. Under freezing conditions with the fans and the spray pump off, the basin water must be prevented from freezing. Electric heaters can be installed in the condenser basin. Optional heaters are available for ambient temperature of -17.8℃ and -28.9℃ in 16.09km/h wind. In addition, the pump suction line, pump, pump discharge line (up to the overflow), and the water make-up line should be wrapped with a heat-tracing parts and layers.

表 5  
Table 5

型 号 Model	标准温度-17.8℃ (千瓦) Standard Temp-17.8℃(KW)	低温-28.9℃ (千瓦) Low Temp-28.9℃(KW)
SEC 320-400	4	6
SEC 505-635	6	8
SEC 660-835	8	12
SEC 895-1275	2x6	2x8
SEC 1455-1885	2x6	2x8
SEC 1795-2490	2x8	2x10

另一种防冻方法是使用室内采暖区域的辅助水槽和喷水循环泵。水从冷凝水盘排出到远置水槽，并在泵关闭时，仍留在室内的远置水槽中。必须确定好水箱（由其他厂家供货）的尺寸，使之可容纳冷凝器的悬浮水以及供水和回水管中的水。必须由垂直扬程、管摩擦阻力损失外加进水口的 7.0 千帕（表压）组成的总压头下，选择可用于规定流量的水泵（由其他厂家提供）。在冷凝器的供水管线上必须安装阀，以便使出水口的压力保持在 70 千帕的表压之下。

An alternative method of freezing protection involves the use of an auxiliary sump tank and spray water recirculating pump, located in a heated indoor space. Water drains from the condenser basin to the remote sump, and when the pump is shut off, the water remains in the indoor remote sump. The tank (supplied by others) must be sized to accommodate water in suspension in the condenser (s) plus the water in supply and return piping. Remote pumps (supplied by others) must be selected for the required flow at a total head which includes the vertical lift, pipe friction, plus 7.0 kpa at the SEC water inlet. A valve should be installed in the condenser water supply line to permit adjustment and maintain pressure below 70 kpa at the SEC water inlet.

容量控制  
Capacity Control

许多系统受到载荷和所处的环境温度条件变化有关。在制冷系统要求具有相对恒定的冷凝压力时，要求进行某种方式的容量控制。风扇循环是最简单便利的容量控制方法。每个风扇设一个电动机的独立风扇系统以及 ENERGY-MISER 风扇系统提供其他控制步骤或更多措施。双速度的风扇电动机可提供类似的容量控制。采用变速控制装置可实现更为精确的控制。

Many systems are subject to wide load variations and substantial changes in ambient temperature conditions. Where refrigeration systems require a relatively constant condensing pressure, some form of capacity control is required. Fan cycling is the simplest and most convenient method of capacity control. The Independent fan system, with one motor per fan, and the ENERGY-MISER Fan System provide additional steps of control and a measure of redundancy. Double-speed fan motors offer similar capacity control. More precise control may be achieved with a variable speed control device.

注意：快速的开-关循环会导致电动机过热。建议将控制器设置为每小时最多允许六次开-关循环。

CAUTION: Rapid on-off cycling can cause the fan motor to overheat. It is recommended that controls be set to allow a maximum of six on-off cycles per hour.

警告：在风扇速度由厂家设定速度更改为其它速度时（包括采用变速控制器），必须采取措施以避免在接近或以风扇的“临界速度”运行时造成人身伤亡和财产损失。

WARNING: When the fan speed is to be changed from the factory-set speed, including using if a variable speed control device, steps must be taken to avoid creating the hazard of personal injury or property damage associated with operating at or near the fan's "critical speed."

由变频驱动装置控制的设备需采用变频专用电动机。

容量控制不采用水泵容量控制。是否喷淋水对容量变化影响很大，以致于这种控制方法经常导致泵的短时循环开闭。此外，盘管干湿交替，会使冷凝盘管的表面易于结垢。

Installations which are to be controlled by Variable Frequency Drives require the use of an inverter duty motor.

Water pump cycling should not be used for capacity control. Capacity changes so greatly with or without spray water that this method of control often results in short cycling of the pump. In addition, alternative wetting and drying of the coil causes scaling on the condensing coil surface.

## 水处理

### Water Treatment

由于水在蒸发冷凝器中蒸发，原存在于水中的固体溶解物仍留在系统中。固体溶解物的浓度增加过快可导致结垢和腐蚀。此外，包括军团菌在内的空气杂质和生物污染物会被引入循环水中。为了控制各种潜在的污染物，必须实施水处理计划。虽然以下对SNOWKEY蒸发式冷凝器的循环水质给出了有关建议，但由水处理专家为给定系统设计一个专门的水处理计划始终都是对最终用户的责任。这一计划应考虑（至少）水质监控、放水率调节、镀锌锌钢表面的钝化、腐蚀水垢的化学处理以及生物控制等多种因素。

As water evaporates in an evaporative condenser, the dissolved solids originally present in the water will remain in the system. The concentration of dissolved solids increases rapidly and can cause scale and corrosion. In addition, airborne impurities and biological contaminants, including Legionella, may be introduced into the recirculating water. To control all potential contaminants, a water treatment program must be employed. Although general recommendations regarding the quality of water circulated through SNOWKEY evaporative condensers are made below, it is always the responsibility of the end-user to contact a competent water treatment specialist to design an application-specific treatment program for a given system. This program should consider (as a minimum) monitoring water quality, adjusting the bleed rate, passivated galvanized steel surfaces, chemically treating for corrosion scale, and biological control, etc.

为了获得最佳热传导效率和最长的设备使用寿命，应控制好浓度变化循环，使循环水符合下表所列的规定。

For optimal heat transfer efficiency and maximum equipment life, the cycles of concentration should be controlled so that the recirculating water is maintained within the guidelines listed in the table below.

表 6  
Table 6

标准 Criteria	镀锌钢结构 Galvanized Steel Construction
PH值 PH	7.0到9.0 7.0to9.0
CaCO <sub>3</sub> 的硬度 Hardness as CaCO <sub>3</sub>	最大30到500ppm 30to500 ppm max
CaCO <sub>3</sub> 的碱性 Alkalinity as CaCO <sub>3</sub>	最大500ppm 500ppm max
固体溶解物总量 Total Dissolved Solids	最大1000ppm 1000ppm
氯化物 Chlorides	最大125ppm 125ppm max
硫酸盐 Sulfates	最大125ppm 125ppm max

当设备具有镀锌锌钢结构并且循环水PH值大于或等于8.3时，要求对镀锌钢进行周期性的钝化处理，以防止生“白锈”，即在镀锌钢表面上生成白色、蜡状的锌腐蚀产物。

Units having galvanized steel construction and a circulating water pH of 8.3 or higher will require periodic passivation of the galvanized steel to prevent "white rust," the accumulation of white, waxy, non-protective zinc corrosion products on galvanized steel surfaces.

水化学变量通常比较复杂而且对不同的应用具有特定性。即使符合上述每一项要求，水的整体质量仍有可能不合格。同样，即使某些标准不在指导方针的建议范围内，照样可以获得合格水质。最终用户应找一位水处理专家专门制订水处理计划并执行之。

The variables in water chemistry are often complex and applications-specific. Even if each of the above requirements are met, it is still possible for the overall water quality to be unacceptable. Likewise, acceptable water quality is achievable with certain criteria outside the recommended guidelines. The end user should implement an application specific treatment program developed and administrated by a water treatment specialist based on the available water supply.

要定期检查水质，以确保对水质适当进行控制。可以用以下公式计算所需的连续放水速率：

The water releasing rate and water quality should be periodically checked to ensure that adequate control of the water quality is being maintained. The required continuous bleed rate will be calculated by the formula:

$$\text{放水速率} = \frac{\text{蒸发率}}{(\text{浓度循环}-1)} \quad \text{Evaporation Rate} \quad (\text{Cycles of Concentration}-1)$$

蒸发率可以通过以下方法之一确定：

The evaporation rate can be determined by one of the following:

- (1) 每293KW的排热量约7.57kg/min.  
(1) approximately 2USGPM per one million Btu/hr of heat rejection.
- (2) 每351.7KW的制冷量约11.36kg/min.  
(2) Approximately 3 USGPM per 100 tons of refrigeration.

浓度循环次数等于循环水中的杂质因汽化而增加的次数。

更多建议详见SNOWKEY操作和维护手册。有关水垢处理、腐蚀或生物控制的具体建议，请向合格的水处理顾问咨询。

Cycles of concentration equal the number of times impurities in the recirculating water have been increased through evaporation.

Refer to the SNOWKEY Operating and Maintenance Instructions for more detailed recommendations. For specific recommendations on water treatment for scale, corrosion or biological control, consult a qualified water treatment consultant.

## 安全 Safety

在产品的安装和定位时，要采取必要的预防措施，以保证人员的安全，防止发生伤亡以及设备、厂房受到损坏。此设备的操作、保养和维修只能由从事这项工作的合格人员进行。在搬运、吊运、安装、操作、保养和修理此设备时必须多加小心，要采用适当的规程和工具，以防止人员伤亡和/或财产损失。

Adequate precautions, appropriate for the installation and location of these products, should be taken to safeguard the public from possible injury and the equipment and the premises from damage. Operation, maintenance and repair of this equipment should be undertaken only by personnel qualified to do so. Proper care, procedures and tools must be used in handling, lifting, installing, operating, maintaining, and repairing this equipment to prevent personal injury and/or property damage.

工程的技术要求  
Engineering Technical Specifications

第1篇：总则  
Part1:General

A. 总则：由厂安装的有引风设计的垂直排风蒸发式冷凝器的提供与安装，在各方面都符合计划给出的技术要求和明细。

A.General: Furnish and install, factory assembled evaporative condenser(s) of induced draft design with vertical discharge, conforming in all aspects to the specifications and schedules as shown on the plans.

B. 容量：制造商要确保蒸发式冷凝器可在35.7摄氏度的冷凝温度以及25.6摄氏度的湿球温度下采用制冷剂运行，具有标准排热量的冷凝能力。

B. Capacity: The manufacturer should grantee that the evaporative condenser can be operated by refrigerant at 35.7℃ condnsing temperature and 25.6℃ wet butt temperature, as well as the standard heat–discharging condensing capacity.

C. 保修：制造商要为机械驱动提供为期一年的保修，保修内容涉及风扇、风扇轴、支座和风扇电动机。制造商从标准设备启动之日起提供为期1年的部件平衡保修，或从标准设备交货之日起提供为期18个月的部件平衡保修，取其中先到期者。

C.Warranty: The manufacturer shall provide one year mechanical drive warranty covering the fans, fan shafts, bearings, sheaves, supports, and fan motors. The manufacturer’ s standard equipment warranty for the balance of the components shall be for a period of one year from the date of startup or eighteen months from the date of shipment, whichever ends first.

D.质量保证：要建立一个经公认注册机关认证符合ISO–9001规定要求的质量管理工作体系，以确保产品和服务质量的一致性。未通过ISO–9001认证的制造商要在不加价的情况下向客户额外提供为期一年的保修服务。

D. Quality Assurance: The manufacturers shall have a Management System certified by an accredited registrar as complying with the requirements of ISO–9001 to ensure consistent quality of products and services. Manufacturers that are not ISO–9001 certified shall provide an additional one year warranty to the customer at no additional cost.

第2篇：产品  
Part2: Products

2.01 蒸发式冷凝器的材料和部件  
Evaporative Condenser Materials and Components

A.总则：所有钢板和结构件都要用耐腐蚀性强的镀锌钢板制作，并在各焊接处涂上富锌漆。

A. General: All steel panels and structural elements shall be constructed from high anti–corrosive galvanized steel, with cut edges given a protective coating of zinc–rich compound.

2.02 备选设备的技术要求  
2.02 Optional Equipment Technical Requirements

A. 蒸发式冷凝器装有水盘加热器，以防止在其停用时，水盘中的水结冰。

A.Evaporative condenser shall be provided with basin heaters to Prevent freezing of the pan water when the evaporative cindenser is idle.

1.要选择好水盘加热器，以便环境温度在–17.8摄氏度以及风速在16.1公里/小时，使水池水温维持在4.4摄氏度。

1.The basin heaters shall be selected to maintain 4.4℃ basin water temperature at a –17.8℃ ambient temperature and 16.1 km/hr wind speed.

2.水盘加热器是电浸没式加热器，受远距恒温器控制，并在池水内放有传感器。

2.Basin heaters shall be electric immersion type controlled by a remote thermostat with the sensing bulb located in the basin water.

3.水盘加热器装有低水位切断开关，以防止加热器在各元件未浸没好时就开始运行。

3.Basin heaters shall be provided with a low water level cut–out switch to prevent heater operation unless the heater elements are adequately submerged.

B.蒸发式冷凝器装有专用电动机盒驱动器，可以使每个风扇进行独立循环。

B. The evaporative condenser shall be supplied with extended motors and drives so that each fan can be cycled independently.

C.蒸发式冷凝器装有在厂家组装供现场安装的外平台，其上备有符合OSHA标准和有关规定的出入梯和梯子扶手，以便出入蒸发式冷凝器的顶部。  
C. The evaporative condenser shall be provided with a factory assembled,field–installed external platform with an access ladder and handrails complying with OSHA standards and regulations to provide access to the top of the evaporative condenser.

1.外部平台具有610毫米宽的防滑行走面和1220毫米高的安全护栏。

1. External platform shall have a 610mm wide non–skid walking surface and 1220mm high safety railings.

2.必要时可按OSHA的规定要求设置设备安全梯笼。

2.Optional ladder safety cage shall be availabe to meet OSHA requirements if necessary.