EVAPORATIVE CONDENSERS

PMC-E

Easy to Install–Easy to Maintain

Available with Optional
304L or 316L Stainless Steel
TITAN COIL

Capacities from
124 to 1,432 Ammonia Tons!

Available with Optional
evapco SMART SHIELD

evapco for LIFE

PMC-E Design and Construction Features

About EVAPCO

EVAPCO is the global innovator in heat transfer solutions. Our pledge is to make everyday life easier, more comfortable, more reliable, and more sustainable for people everywhere. With 26 locations spread throughout 10 countries and over 200 active patents worldwide—we are the team that engineers and contractors know they can count on for life.

Contact

your local EVAPCO sales representative or visit **evapcoasia.com** to learn more.

PVC Water Distribution with ZM®II Nozzles

- Large orifice prevents clogging **(no moving parts)**.
- Redesigned nozzles for superior water distribution.
- Threaded nozzles eliminate troublesome grommets.
- Fixed position require zero maintenance.
- Threaded end caps for ease of cleaning.
- Guaranteed for life.

Thermal Pak II® Heat Transfer Technology

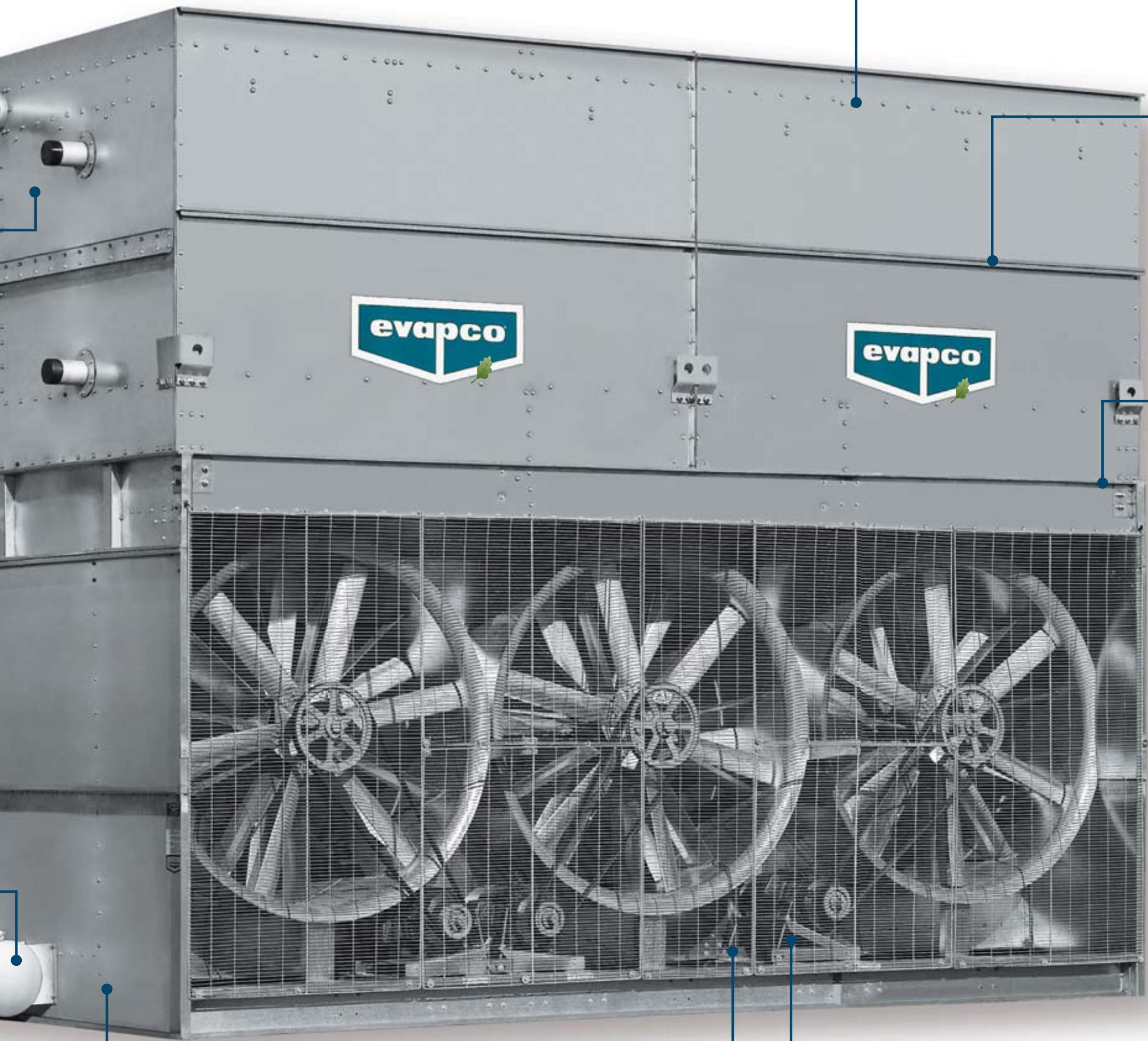
- More surface area per plan area than competitive designs.
- Improved heat transfer efficiency due to tube geometry and orientation of tubes.
- Lower refrigerant charge.
- Optional 304L or 316L TITAN stainless steel coil technology.

Improved Water Distribution Piping

- Horizontally mounted pumps allow for reduced basin water level.*
- Simplified piping for easier basin access.
- Totally enclosed pump motors assure long, trouble-free life.

**Refer to engineering data for availability.*

The industry standard for forced draft axial fan condensers. The PMC-E is equipped with owner-oriented features and benefits that make it ***easy*** to install… ***easy*** to maintain, and ***easy*** on the operating budget… ***It's the easy choice!***



Water Saver Drift Eliminators

- Reduce drift rate to 0.001%.
- Saves water and reduces water treatment cost.
- Greater structural integrity vs.old style blade-type.
- Recessed into casing for greater protection.

Double-Brake Flange Joints

- Stronger than single-brake designs by others.
- Greater structural integrity.
- Minimizes water leaks at field joints.

Unique Field Seam

- Eliminates up to 85% of fasteners.
- Self guiding channels improve quality of field seam to eliminate leaks.
- Easy to install.
- Lower installation cost.

Optional Design Features:

- Oversized access doors.
- External service platforms.
- Tandem fan drive system (standard fan only).
- Stainless steel construction.

Optional Oversized Access Door

Sloped Pan Bottom

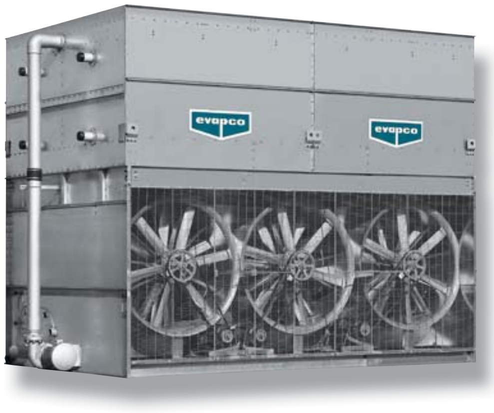
- Pan bottom slopes to drain.
- Easy to clean.
- Stainless steel strainer resists corrosion.

Individual Fan Drive System

- Increased flexibility for improved capacity control.
- Greater reliability through redundancy.
- Easy motor replacement.
- Front-mounted drives for improved maintenance accessibility.

PMC-E Design Features

Proven Performance & Design Flexibility



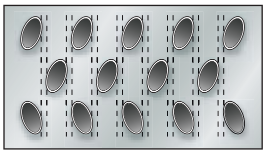
The PMC-E Evaporative Condenser offers more capacity and greater system design flexibility than ever before. EVAPCO's research and development team has invested hundreds of hours in laboratory testing to develop the next generation in Forced Draft Condenser Technology. These efforts have produced an efficient fan section design combined with the proven Thermal-Pak II® coil technology to offer improved condenser performance.

The PMC-E features more plan area options and fan horsepower options for the system design engineer. With more condenser capacity, more plan area options, and greater flexibility in motor selection, the design engineer can now match the condenser performance to the specific application requirements. More equipment choices and more design flexibility mean greater value for the end user.

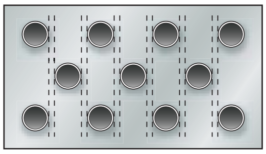
Thermal-Pak II® Coil Design

Lower Refrigerant Charge

Only EVAPCO condensers offer the unique Thermal-Pak II® Coil which assures greater operating efficiency. Its unique elliptical tube design allows for closer tube spacing resulting in more surface area per plan area than traditional round tube designs. The Thermal-Pak II® Coil design has a lower resistance to air flow and permits greater water loading, making the Thermal-Pak II® Coil the most efficient design available to yield a low refrigerant charge.



Thermal-Pak II® Coil by EVAPCO



Round Tube Coil by Others

Energy Efficient for Lowest Operating Cost

Lower Horsepower Options

The fan drive system of the PMC-E utilizes large diameter vane-axial fans in a two stage arrangement to provide more efficient air flow and reduced power consumption. When compared to the traditional centrifugal fan condenser models, the vane-axial fan design can offer up to a 50% reduction in energy consumption. And, with the new PMC-E model selections **even more low horsepower options are available to obtain greater energy savings**.

Individual Fan Drive System

Capacity Control Flexibility & Operating Redundancy

The PMC-E fan drive system provides individual motor-to-fan configuration **as standard equipment** on all models. The dedicated fan-to-motor arrangement ensures less "wear and tear" on the drive system versus tandem fan motor drive arrangements resulting in less maintenance. The individual motor-to-fan design offers greater capacity control flexibility to match the system load requirements. In addition, all EVAPCO condensers are equipped with an internal baffle system, which extends from the pan bottom vertically through the coil bundle. This unique design allows the user to cycle fan motors independently without harmful effects of air bypass inside the unit. The individual motor-to-fan design ensures maximum operating redundancy in the condenser fan system when critical operation is necessary.

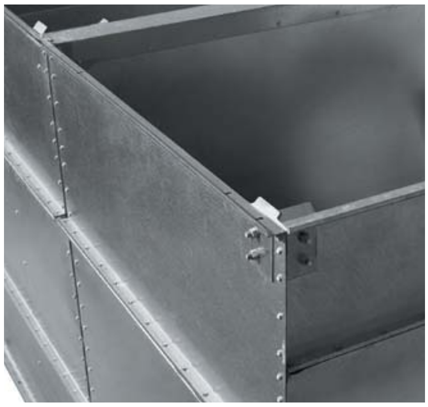
Inverter Duty Motors STANDARD

Inverter Duty motors are standard on PMC-E Condensers. Inverter Duty motors are totally enclosed, offering high efficiency and inverter capable (VFD by others).

***NOTE*: Variable Frequency Drive (VDF) control may require other component modification such as motor shaft grounding brushes, AC load reactors, low pass filters and tuned trap filters to ensure proper motor performance and service life.**

PMC-E Design Features

Easy Field Assembly



Fewer Fasteners
Lower Installed Cost

The PMC-E features a field seam design which ensures easier assembly and fewer field seam leaks. The field seam incorporates self-guiding channels to guide the coil casing section into position and set in place on the bottom fan section of the condenser. In addition, the design eliminates up to 85% of the required fasteners typically used to join the condenser sections in the field significantly reducing the contractor labor costs for installation.

Improved Maintenance

Fan Drive Accessibility

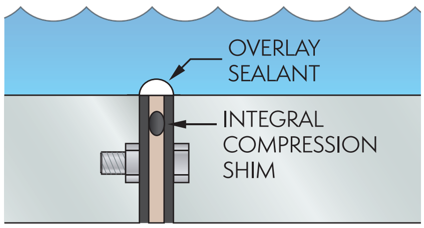
The drive components of the PMC-E are easily accessed for routine maintenance from the front of the unit. Bearing grease fittings are extended to the outside of the unit for ease of lubrication. All drive sheaves have been relocated to the front of the fan section and motors are positioned on a platform base to allow for easy belt tension adjustment.

Easy Clean Sloped Basin

The PMC-E basin is designed to improve maintenance access and make it easier for operating technicians to clean. The bottom of the pan is sloped to the unit drain to ensure that the basin will completely drain and allow sediment and debris that may collect in the basin to be easily flushed from the unit. The design helps to prevent buildup of sedimentary deposits, biological films and standing water. In addition, EVAPCO offers an oversized access door option to improve access to this critical area of the unit.

Construction Features

Unique Seam Design–Eliminate Field Leaks



The PMC-E features EVAPCO's unique panel construction design which includes a special butyl tape sealer with an integral sealing gasket. Each joint is then backed with a secondary caulking compound and encased in a double-brake flange for added strength and structural integrity. This unique sealing system has been proven effective in both laboratory tests and years of field application.

Superior Water Saver Drift Eliminators

The PMC-E condensers incorporate a highly efficient PVC drift eliminator. The eliminator removes entrained water droplets from the air stream to limit the drift rate to less than 0.001% of the recirculating water rate. With a low drift rate, PMC-E condensers save valuable water and water treatment chemicals. The eliminators feature a honeycomb design which offers greater structural integrity and are recessed in the top of the casing and UV protected for longer life. They are constructed of inert polyvinyl chloride (PVC) which eliminates corrosion in this critical area of the condenser. The eliminators are assembled in sections for easy handling and removal for coil and water distribution system inspection.

PMC-E Selection Procedure

Selection Procedure

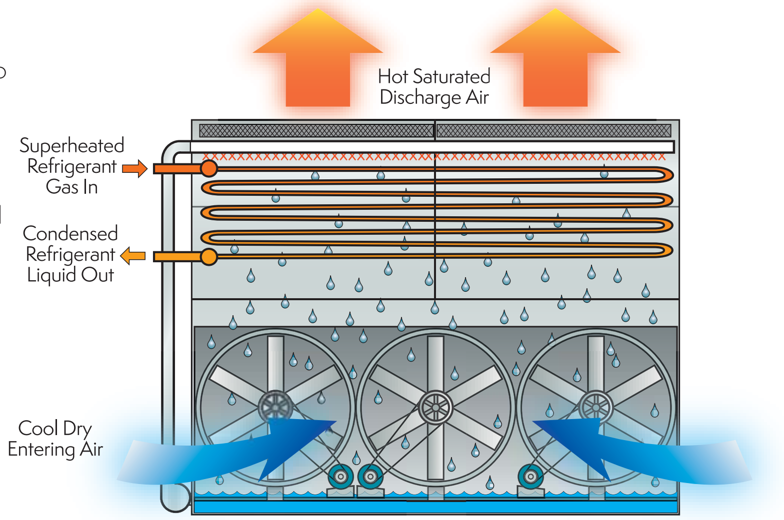
Two methods of selection are presented, the first is based on the total heat of rejection as described immediately below. The second, and simpler, method is based on evaporator tons. The evaporator ton method is only applicable to systems with open type reciprocating compressors.

The heat of rejection method is applicable to all but centrifugal compressor applications and is normally used for selecting evaporative condensers for use with hermetic compressors and screw compressors. It can also be used for standard open type reciprocating compressors as an alternate to the evaporator ton method.

The evaporator ton method is based on the estimated heat of compression. **The heat of rejection method of selection is more accurate and should be used whenever possible.**

Refer to the factory for selections on systems with centrifugal compressors.

Principle of Operation



The refrigerant gas is discharged from the compressor into the inlet connection of the evaporative condenser. Water from the condenser's sump is continuously flooded over the condenser coil, while ambient air is simultaneously forced into the unit. As the ambient air moves up through the coil section, a portion of the spray water is evaporated into the air stream.

The evaporative process cools the spray water, which in turn cools the tubes containing the refrigerant gas. The cool tube walls cause the refrigerant gas to give up heat and condense into a liquid. The condensed liquid flows out of the coil's sloping tubes to the high pressure liquid receiver for return to the system.

The hot, saturated air is driven through the drift eliminators, where any entrained water droplets are removed. The condenser's fan then discharges this air stream out of the top of the unit at a high velocity, where it can dissipate harmlessly into the atmosphere. The water which was not evaporated falls into the sump and is recirculated by the spray pump to the water distribution system above the condensing coil section.

Heat of Rejection Method

In the heat of rejection method, a factor for the specified operating conditions (condensing temperature and wet bulb) is obtained from **Table 1** or **2** and multiplied times the heat of rejection.

The resultant figure is used to select a unit from **Table 3** on page 8. Unit capacities are given in **Table 3** in kW.

If the heat of rejection is not known, it can be determined by one of the following formulas:

Open Compressors: Heat of Rejection (kW) = Evaporator Load (kW) + Compressor BHP (kW)

Hermetic Compressors: Heat of Rejection (kW) = Evaporator Load (kW) + kW Compressor Input (kW)

PMC-E Selection Procedure

EXAMPLE - S.I. Units

Given: 600 kW load, HCFC-22 refrigerant, 35°C condensing temperature, 26°C wet blub temperature with a 150kW compressor.

Selection:

Evaporator Load	=	600kW
Compressor Load	=	150kW
Total	=	750kW

From Table 1 the capacity factor for 35°C condensing temperature and 26°C wet blub temperature is 1.71. Therefore, the corrected heat of rejection load is:

750kW	X	1.71	=	1282.5kW
(Total Heat of Rejection)		(Capacity Factor)		(Corrected Heat Rejection Load)

Model PMC-325E is selected by using the unit heat of rejection capacities found in Table 3.

NOTE: *For screw compressor selections employing water cooled oil cooling, select a condenser for the total kW as in the example. The condenser can then function in one of two ways:*

(1) Recirculating water from the water sump can be used directly in the oil cooler. A separate pump should be employed and the return water should be directed into the water sump at the opposite end from the pump suction.

(2) The condenser coil can be circuited so that water or a glycol-water mixture for the oil cooler can be cooled in a separate section of the coil. Specify load and water flow required.

For refrigerant injection cooled screw compressors, select the condenser in the same manner as shown in the example.

If the oil cooler is supplied by water from a separate source, then the oil cooling load should be deducted from the heat of rejection before making the selection.

COND. PRESSURE (kPa)		COND. TEMP. (°C)	WET BULB TEMPERATURE (°C)																	
HCFC-22	HFC-134a		10	12	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1090	669	30	1.07	1.15	1.25	1.38	1.47	1.57	1.69	1.83	2.00	2.23	2.50	2.86	3.36	-	-	-	-	-
1154	718	32	0.94	1.01	1.09	1.19	1.26	1.32	1.40	1.49	1.60	1.74	1.90	2.11	2.36	-	-	-	-	-
1220	759	34	0.85	0.90	0.97	1.04	1.09	1.14	1.20	1.26	1.34	1.43	1.54	1.66	1.81	2.02	2.31	-	-	-
1253	785	35	0.80	0.85	0.91	0.97	1.02	1.06	1.11	1.15	1.21	1.29	1.37	1.46	1.56	1.71	1.89	2.13	2.41	2.77
1287	814	36	0.77	0.81	0.86	0.92	0.96	1.00	1.04	1.07	1.13	1.19	1.26	1.34	1.43	1.56	1.71	1.90	2.14	2.43
1359	856	38	0.70	0.74	0.78	0.82	0.85	0.86	0.90	0.93	0.96	1.01	1.06	1.11	1.18	1.26	1.35	1.47	1.62	1.78
1431	915	40	0.65	0.67	0.70	0.73	0.76	0.78	0.80	0.83	0.86	0.89	0.93	0.97	1.02	1.08	1.14	1.22	1.32	1.44
1508	978	42	0.59	0.62	0.64	0.67	0.68	0.70	0.72	0.74	0.77	0.80	0.83	0.86	0.89	0.94	0.98	1.04	1.11	1.19
1587	1026	44	0.54	0.56	0.59	0.61	0.62	0.63	0.65	0.66	0.68	0.70	0.73	0.75	0.78	0.82	0.85	0.89	0.92	0.97

Table 1 — HCFC-22 and HFC-134a Heat Rejection Factors

COND. PRESSURE (kPa)	COND. TEMP. (°C)	WET BULB TEMPERATURE (°C)																	
		10	12	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1063	30	0.95	1.03	1.12	1.23	1.31	1.40	1.51	1.63	1.79	1.99	2.24	2.56	3.00	-	-	-	-	-
1133	32	0.84	0.90	0.97	1.06	1.12	1.18	1.25	1.32	1.43	1.55	1.70	1.88	2.11	-	-	-	-	-
1206	34	0.76	0.81	0.86	0.93	0.98	1.02	1.07	1.12	1.19	1.28	1.36	1.48	1.61	1.80	2.06	-	-	-
1245	35	0.71	0.76	0.81	0.87	0.91	0.95	0.99	1.03	1.08	1.15	1.23	1.30	1.39	1.53	1.69	1.90	2.15	2.47
1284	36	0.69	0.73	0.77	0.82	0.86	0.89	0.92	0.96	1.01	1.07	1.13	1.20	1.28	1.39	1.53	1.70	1.91	2.17
1365	38	0.63	0.66	0.69	0.73	0.76	0.78	0.81	0.83	0.86	0.90	0.94	0.99	1.05	1.12	1.21	1.31	1.44	1.59
1451	40	0.58	0.60	0.62	0.65	0.67	0.70	0.72	0.74	0.76	0.80	0.83	0.87	0.91	0.96	1.02	1.09	1.18	1.29
1539	42	0.53	0.55	0.57	0.60	0.61	0.63	0.64	0.66	0.68	0.71	0.74	0.76	0.80	0.84	0.88	0.93	0.99	1.06
1630	44	0.49	0.50	0.52	0.54	0.56	0.56	0.58	0.59	0.61	0.63	0.65	0.67	0.70	0.73	0.76	0.79	0.83	0.86

Table 2 — Ammonia (R-717) Heat Rejection Factors

PMC-E Selection Procedure

MODEL	kW BASE	MODEL	kW BASE	MODEL	kW BASE	MODEL	kW BASE	MODEL	kW BASE	MODEL	kW BASE
PMC-175E	754	PMC-457E	1969	PMC-631E	2719	PMC-803E	3460	PMC-1004E	4326	PMC-1446E	6231
PMC-190E	819	PMC-464E	2000	PMC-634E	2732	PMC-811E	3495	PMC-1006E	4335	PMC-1466E	6317
PMC-210E	905	PMC-479E	2064	PMC-636E	2741	PMC-816E	3516	PMC-1013E	4365	PMC-1473E	6348
PMC-220E	948	PMC-481E	2073	PMC-640E	2757	PMC-819E	3529	PMC-1024E	4413	PMC-1549E	6675
PMC-235E	1013	PMC-488E	2103	PMC-641E	2761	PMC-831E	3581	PMC-1038E	4473	PMC-1556E	6705
PMC-240E	1034	PMC-491E	2115	PMC-645E	2780	PMC-840E	3620	PMC-1056E	4550	PMC-1586E	6834
PMC-250E	1077	PMC-492E	2120	PMC-647E	2787	PMC-852E	3672	PMC-1072E	4619	PMC-1599E	6891
PMC-275E	1185	PMC-495E	2133	PMC-668E	2878	PMC-853E	3676	PMC-1073E	4624	PMC-1625E	7003
PMC-295E	1271	PMC-501E	2158	PMC-675E	2908	PMC-856E	3689	PMC-1088E	4689	PMC-1705E	7348
PMC-325E	1401	PMC-503E	2168	PMC-679E	2926	PMC-863E	3719	PMC-1116E	4809	PMC-1712E	7378
PMC-332E	1431	PMC-513E	2210	PMC-688E	2965	PMC-888E	3827	PMC-1117E	4814	PMC-1776E	7654
PMC-335E	1444	PMC-515E	2219	PMC-690E	2973	PMC-889E	3831	PMC-1127E	4857	PMC-1788E	7705
PMC-360E	1551	PMC-519E	2237	PMC-691E	2977	PMC-894E	3853	PMC-1137E	4899	PMC-1811E	7803
PMC-362E	1560	PMC-530E	2283	PMC-715E	3080	PMC-895E	3856	PMC-1148E	4947	PMC-1877E	8089
PMC-369E	1590	PMC-536E	2310	PMC-719E	3098	PMC-900E	3878	PMC-1182E	5094	PMC-1879E	8097
PMC-375E	1616	PMC-537E	2313	PMC-723E	3116	PMC-905E	3900	PMC-1189E	5124	PMC-1911E	8234
PMC-376E	1620	PMC-545E	2348	PMC-725E	3123	PMC-913E	3934	PMC-1203E	5184	PMC-1913E	8243
PMC-386E	1663	PMC-546E	2352	PMC-731E	3150	PMC-929E	4003	PMC-1205E	5192	PMC-1985E	8554
PMC-397E	1711	PMC-558E	2405	PMC-732E	3154	PMC-939E	4047	PMC-1211E	5219	PMC-2019E	8700
PMC-400E	1724	PMC-559E	2409	PMC-735E	3166	PMC-940E	4051	PMC-1261E	5434		
PMC-408E	1758	PMC-564E	2431	PMC-737E	3176	PMC-949E	4090	PMC-1269E	5469		
PMC-411E	1771	PMC-568E	2447	PMC-751E	3236	PMC-955E	4115	PMC-1275E	5494		
PMC-420E	1810	PMC-579E	2494	PMC-752E	3241	PMC-956E	4120	PMC-1286E	5541		
PMC-426E	1836	PMC-591E	2547	PMC-772E	3327	PMC-959E	4132	PMC-1290E	5559		
PMC-427E	1840	PMC-596E	2568	PMC-774E	3335	PMC-962E	4146	PMC-1296E	5584		
PMC-428E	1844	PMC-600E	2585	PMC-778E	3353	PMC-976E	4206	PMC-1333E	5744		
PMC-431E	1857	PMC-601E	2590	PMC-792E	3413	PMC-980E	4223	PMC-1358E	5852		
PMC-450E	1939	PMC-602E	2593	PMC-796E	3430	PMC-983E	4236	PMC-1376E	5930		
PMC-453E	1952	PMC-605E	2607	PMC-800E	3448	PMC-989E	4262	PMC-1382E	5956		
PMC-456E	1964	PMC-616E	2654	PMC-801E	3452	PMC-992E	4275	PMC-1438E	6197		

Table 3 — Unit Heat Rejection

Note: The heat of rejection in Table 3 is based on HCFC-22 or HFC-134a standard conditions of 40.6℃(105℉) condensing and 25.6℃(78℉) wet bulb.

PMC-E Selection Procedure

Evaporator Ton Method

In the evaporator ton method, factors for the specified operating conditions (suction temperature, condensing temperature and wet bulb) are obtained from either Table 5 or 6 and multiplied times the heat load in tons. The resultant figure is used to select a unit from Table 4. The condenser model in Table 4 is equal to the unit capacity in evaporator tons for HCFC-22 or HFC-134a conditions of 105°F (40.6°C) condensing, 40°F (4.5°C) suction and 78°F (25.6°C) wet bulb.

EXAMPLE

GIVEN: 300 ton evaporator load, R-717, condensing at 95° F (35°C), with +10° F (-12.2°C) suction and 76° F (24.4°C) wet bulb temperatures.

SELECTION: The capacity factor from Table 6 for the given condensing and wet bulb conditions is 1.38, and the capacity factor for the suction temperature of +10° F (-12.2°C) is 1.03, so the corrected capacity required may be determined as:

300 X 1.38 X 1.03 = 426 corrected tons. Therefore, select a model PMC-427E, PMC-428E, PMC-431E or PMC-450E depending on unit type desired, and any layout or horsepower considerations.

PMC-E MODELS

MODEL	CAPACITY	MODEL	CAPACITY	MODEL	CAPACITY	MODEL	CAPACITY	MODEL	CAPACITY	MODEL	CAPACITY
PMC-175E	175	PMC-457E	457	PMC-631E	631	PMC-803E	803	PMC-1004E	1004	PMC-1446E	1446
PMC-190E	190	PMC-464E	464	PMC-634E	634	PMC-811E	811	PMC-1006E	1006	PMC-1466E	1466
PMC-210E	210	PMC-479E	479	PMC-636E	636	PMC-816E	816	PMC-1013E	1013	PMC-1473E	1473
PMC-220E	220	PMC-481E	481	PMC-640E	640	PMC-819E	819	PMC-1024E	1024	PMC-1549E	1549
PMC-235E	235	PMC-488E	488	PMC-641E	641	PMC-831E	831	PMC-1038E	1038	PMC-1556E	1556
PMC-240E	240	PMC-491E	491	PMC-645E	645	PMC-840E	840	PMC-1056E	1056	PMC-1586E	1586
PMC-250E	250	PMC-492E	492	PMC-647E	647	PMC-852E	852	PMC-1072E	1072	PMC-1599E	1599
PMC-275E	275	PMC-495E	495	PMC-668E	668	PMC-853E	853	PMC-1073E	1073	PMC-1625E	1625
PMC-295E	295	PMC-501E	501	PMC-675E	675	PMC-856E	856	PMC-1088E	1088	PMC-1705E	1705
PMC-325E	325	PMC-503E	503	PMC-679E	679	PMC-863E	863	PMC-1116E	1116	PMC-1712E	1712
PMC-332E	332	PMC-513E	513	PMC-688E	688	PMC-888E	888	PMC-1117E	1117	PMC-1776E	1776
PMC-335E	335	PMC-515E	515	PMC-690E	690	PMC-889E	889	PMC-1127E	1127	PMC-1788E	1788
PMC-360E	360	PMC-519E	519	PMC-691E	691	PMC-894E	894	PMC-1137E	1137	PMC-1811E	1811
PMC-362E	362	PMC-530E	530	PMC-715E	715	PMC-895E	895	PMC-1148E	1148	PMC-1877E	1877
PMC-369E	369	PMC-536E	536	PMC-719E	719	PMC-900E	900	PMC-1182E	1182	PMC-1879E	1879
PMC-375E	375	PMC-537E	537	PMC-723E	723	PMC-905E	905	PMC-1189E	1189	PMC-1911E	1911
PMC-376E	376	PMC-545E	545	PMC-725E	725	PMC-913E	913	PMC-1203E	1203	PMC-1913E	1913
PMC-386E	386	PMC-546E	546	PMC-731E	731	PMC-929E	929	PMC-1205E	1205	PMC-1985E	1985
PMC-397E	397	PMC-558E	558	PMC-732E	732	PMC-939E	939	PMC-1211E	1211	PMC-2019E	2019
PMC-400E	400	PMC-559E	559	PMC-735E	735	PMC-940E	940	PMC-1261E	1261		
PMC-408E	408	PMC-564E	564	PMC-737E	737	PMC-949E	949	PMC-1269E	1269		
PMC-411E	411	PMC-568E	568	PMC-751E	751	PMC-955E	955	PMC-1275E	1275		
PMC-420E	420	PMC-579E	579	PMC-752E	752	PMC-956E	956	PMC-1286E	1286		
PMC-426E	426	PMC-591E	591	PMC-772E	772	PMC-959E	959	PMC-1290E	1290		
PMC-427E	427	PMC-596E	596	PMC-774E	774	PMC-962E	962	PMC-1296E	1296		
PMC-428E	428	PMC-600E	600	PMC-778E	778	PMC-976E	976	PMC-1333E	1333		
PMC-431E	431	PMC-601E	601	PMC-792E	792	PMC-980E	980	PMC-1358E	1358		
PMC-450E	450	PMC-602E	602	PMC-796E	796	PMC-983E	983	PMC-1376E	1376		
PMC-453E	453	PMC-605E	605	PMC-800E	800	PMC-989E	989	PMC-1382E	1382		
PMC-456E	456	PMC-616E	616	PMC-801E	801	PMC-992E	992	PMC-1438E	1438		

Table 4 — Unit Sizes

Note: The condenser model in Table 4 is equal to the unit capacity in evaporator tons for HCFC-22 or HFC-134a conditions of 40.6°C(105°F) condensing, 44°C(40°F) suction and 25.6°C(78°F) wet bulb.

PMC-E Selection Procedure

S.I. Units

COND. PRESSURE (kPa)		COND. TEMP. (°C)	WET BULB TEMPERATURE (°C)																	
HCFC-R22	HFC-134a		10	12	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1090	669	30	1.02	1.10	1.19	1.32	1.41	1.50	1.61	1.74	1.90	2.12	2.38	2.73	3.20	-	-	-	-	-
1154	718	32	0.91	0.97	1.05	1.15	1.21	1.28	1.35	1.43	1.55	1.67	1.83	2.03	2.27	-	-	-	-	-
1220	759	34	0.82	0.88	0.94	1.01	1.06	1.11	1.16	1.22	1.30	1.39	1.50	1.62	1.75	1.96	2.24	-	-	-
1253	785	35	0.78	0.83	0.89	0.95	0.99	1.03	1.08	1.12	1.18	1.26	1.34	1.43	1.52	1.67	1.85	2.08	2.35	2.70
1287	814	36	0.75	0.80	0.85	0.90	0.94	0.98	1.01	1.05	1.11	1.17	1.24	1.32	1.40	1.53	1.68	1.86	2.09	2.38
1359	856	38	0.69	0.73	0.77	0.81	0.84	0.87	0.89	0.92	0.96	1.00	1.05	1.10	1.17	1.25	1.34	1.45	1.60	1.76
1431	915	40	0.64	0.67	0.70	0.73	0.75	0.78	0.80	0.83	0.86	0.89	0.93	0.97	1.01	1.07	1.14	1.22	1.32	1.44
1508	978	42	0.60	0.62	0.64	0.67	0.69	0.71	0.73	0.75	0.77	0.80	0.83	0.86	0.90	0.94	0.99	1.05	1.11	1.19

SUCTION TEMP. (°C)		-28.9	-23.3	-17.8	-12.2	-6.7	-1.1	4.4	10.0
SUCTION PRESS. (kPa)	HCFC-22	69.6	113.8	165.5	226.1	296.5	378.5	472.3	579.2
	HFC-134a	-12.4	13.1	44.8	82.0	126.9	180.0	241.3	313.0
CAPACITY FACTOR		1.22	1.17	1.13	1.09	1.06	1.03	1.00	0.97

Table 5a — HCFC-22 and HFC-134a Capacity Factors

S.I. Units

COND. PRESSURE (kPa)	COND. TEMP. (°C)	WET BULB TEMPERATURE (°C)																	
		10	12	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1063	30	0.96	1.03	1.12	1.24	1.32	1.41	1.52	1.65	1.80	2.00	2.25	2.57	3.02	-	-	-	-	-
1133	32	0.85	0.92	0.99	1.08	1.14	1.20	1.27	1.35	1.45	1.57	1.72	1.91	2.14	-	-	-	-	-
1206	34	0.78	0.83	0.88	0.95	1.00	1.05	1.10	1.15	1.22	1.31	1.41	1.52	1.66	1.85	2.11	-	-	-
1245	35	0.74	0.78	0.83	0.89	0.94	0.98	1.02	1.06	1.11	1.19	1.27	1.34	1.44	1.58	1.75	1.96	2.22	2.56
1284	36	0.71	0.75	0.80	0.85	0.89	0.92	0.96	0.99	1.04	1.10	1.17	1.24	1.32	1.43	1.57	1.75	1.97	2.24
1365	38	0.65	0.69	0.72	0.76	0.79	0.82	0.84	0.86	0.90	0.94	0.98	1.03	1.10	1.17	1.26	1.37	1.51	1.66
1451	40	0.60	0.63	0.66	0.69	0.71	0.74	0.76	0.77	0.80	0.84	0.88	0.92	0.95	1.01	1.07	1.15	1.24	1.35
1539	42	0.56	0.58	0.60	0.63	0.65	0.67	0.69	0.70	0.73	0.76	0.78	0.81	0.84	0.89	0.94	0.99	1.05	1.12

SUCTION TEMP. (°C)	-34.4	-28.9	-23.3	-17.8	-12.2	-6.7	-1.1	4.4
SUCTION PRESS. (kPa)	-11.0	24.8	62.1	108.2	164.1	231.0	310.3	404.0
CAPACITY FACTOR	1.18	1.14	1.10	1.07	1.03	1.00	0.97	0.95

Table 6 — Ammonia (R-717) Capacity Factors

NOTE: Consult factory for selections using other refrigerants.

PMC-E Selection Procedure

English Units

COND. PRESSURE (psig)		COND. TEMP. (°F)	WET BULB TEMPERATURE (°F)																	
HCFC-22	HFC-134a		50	55	60	62	64	66	68	70	72	74	75	76	77	78	80	82	84	86
156	95	85	1.05	1.16	1.32	1.43	1.53	1.66	1.83	2.02	2.30	2.64	2.87	3.13	3.46	3.80	-	-	-	-
168	104	90	0.90	0.98	1.10	1.17	1.24	1.31	1.40	1.52	1.65	1.82	1.93	2.05	2.17	2.30	2.75	3.38	-	-
182	114	95	0.78	0.85	0.93	0.98	1.02	1.07	1.12	1.19	1.28	1.37	1.42	1.46	1.52	1.60	1.78	2.02	2.31	2.70
196	124	100	0.70	0.75	0.81	0.84	0.87	0.90	0.93	0.97	1.02	1.08	1.11	1.14	1.19	1.23	1.33	1.44	1.61	1.80
211	135	105	0.63	0.66	0.70	0.72	0.75	0.77	0.80	0.83	0.87	0.97	0.93	0.95	0.97	1.00	1.06	1.13	1.23	1.35
226	146	110	0.57	0.60	0.63	0.65	0.66	0.68	0.70	0.72	0.75	0.78	0.79	0.81	0.83	0.85	0.89	0.94	0.99	1.05

SUCTION TEMP. (°F)		-20°	-10°	0°	+10°	+20°	+30°	+40°	+50°
SUCTION PRESS. (psig)	HCFC-22	10.1	16.5	24.0	32.8	43.0	54.9	68.5	84.0
	HFC-134a	-1.8	1.9	6.5	11.9	18.4	26.1	35.0	45.4
CAPACITY FACTOR		1.22	1.17	1.13	1.09	1.06	1.03	1.00	0.97

Table 5b — HCFC-22 and HFC-134a Capacity Factors

English Units

COND. PRESSURE (psig)	COND. TEMP. (°F)	WET BULB TEMPERATURE (°F)																	
		50	55	60	62	64	66	68	70	72	74	75	76	77	78	80	82	84	86
152	85	0.99	1.09	1.25	1.34	1.44	1.57	1.73	1.91	2.17	2.49	2.71	2.95	3.26	3.59	-	-	-	-
166	90	0.84	0.93	1.03	1.10	1.16	1.23	1.32	1.42	1.55	1.71	1.81	1.92	2.04	2.16	2.59	3.17	-	-
181	95	0.74	0.80	0.87	0.92	0.97	1.01	1.06	1.12	1.21	1.29	1.33	1.38	1.44	1.51	1.68	1.91	2.18	2.55
185	96.3	0.72	0.78	0.85	0.89	0.93	0.97	1.01	1.07	1.14	1.22	1.26	1.30	1.35	1.41	1.56	1.76	2.01	2.33
197	100	0.66	0.71	0.76	0.79	0.82	0.85	0.87	0.91	0.96	1.01	1.04	1.07	1.12	1.15	1.25	1.36	1.52	1.69
214	105	0.59	0.62	0.66	0.68	0.71	0.73	0.75	0.78	0.82	0.86	0.88	0.90	0.91	0.94	1.00	1.07	1.16	1.27
232	110	0.53	0.56	0.59	0.61	0.62	0.64	0.66	0.68	0.71	0.73	0.74	0.76	0.78	0.80	0.84	0.89	0.93	0.99

SUCTION TEMP. (°F)	-30°	-20°	-10°	0°	+10°	+20°	+30°	+40°
SUCTION PRESS. (psig)	-1.6	3.6	9.0	15.7	23.8	33.5	45.0	58.6
CAPACITY FACTOR	1.18	1.14	1.10	1.07	1.03	1.00	0.97	0.95

Table 6b — Ammonia (R-717) Capacity Factors

NOTE: Consult factory for selections using other refrigerants.

Optional Equipment

Smart Shield® Solid Chemistry Water Treatment System

EVAPCO's SmartShield® solid chemistry water treatment system is an innovative solution to conventional liquid chemical programs. SmartSheild® was developed specifically for evaporative condensers and closed circuit coolers. The system comes factory mounted and includes all the components required for an effective water treatment system. Solid products eliminate the potential for liquid spills making it easier and safer to use. Controlled release chemistry provides uniform treatment over a 30-day period.

Oversized Access Door

For enhanced basin accessibility, the oversized access door option enables maintenance personnel to quickly and easily enter the basin for float valve adjustment and unit inspection.

Self-Supporting Service Platforms

Condensers are available with self-supporting service platforms that include access ladders, which are designed for easy field installation. This option offers significant savings in comparison to field-constructed, externally supported catwalks. The EVAPCO service platform option may be installed on either side, or the end opposite the connections.

Two-Speed Motors

Two-speed fan motors can provide an excellent means of capacity control. In periods of lightened loads or reduced wet bulb temperatures, the fans can operate at low speed, which will provide about 60% of full speed capacity, yet consume only about 15% of the power compared with high speed. In addition to the energy savings, the sound levels of the units will be greatly reduced at low speed.

Remote Sump Configuration

For units operating in areas where temperatures may be very low, or where low temperatures may occur during periods when the unit is not operating, a sump located inside the building is the preferred means of ensuring that the basin water will not freeze. For these applications, the condenser will be supplied without the spray pump, suction strainers and all associated piping, but with an oversize bottom outlet.

Electric Water Level Control

Evaporative condensers may be ordered with an electric water level control in lieu of the standard mechanical float and makeup assembly. This package provides accurate control of water levels and does not require field adjustment.

Water Level Indicator

Condensers may be supplied with a water level indicator to provide a visual indication of basin water level without opening access doors. The level indicator can be furnished with an optional low and high level alarm switches or a transmitter for continuous level monitoring.

ASME Coils

Evaporative condensers can be furnished with condensing coils manufactured in accordance with the ASME Pressure Vessel Code Section VIII, Division I. Coils built with this option will bear a U-stamp indicating their compliance with the ASME code.

TITAN Coils – Stainless Steel Construction

EVAPCO offers the option of Type 304L or Type 316L stainless steel construction using the Thermal-Pak II® coil design. Highly efficient heat transfer coils with the ultimate corrosion protection.

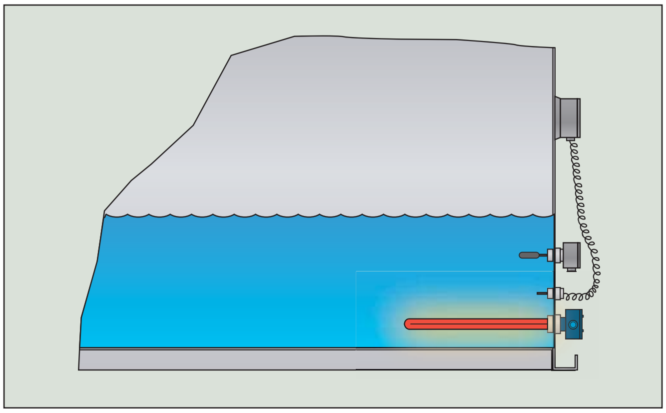
Multiple Circuit Coils

Condensers may be supplied with multiple circuit coils to match various system requirements such as split systems, or if a glycol or water circuit is desired for compressor head cooling.

Electric Heaters/Steel Support

Electric Heaters

Electric immersion heaters are available factory installed in the basin of the condenser. They are sized to maintain a +4˚C to +5˚C pan water temperature with the fans off and an ambient air temperature of -18˚C, -29˚C, or -40˚C. They are furnished with a combination thermotetat/low water protection device to cycle the heater on when required and to prevent the heater elements from energizing unless they are completely submerged. All components are in weather proof enclosures for outdoor use. The heater power contactors and electric wiring are not included as standard.

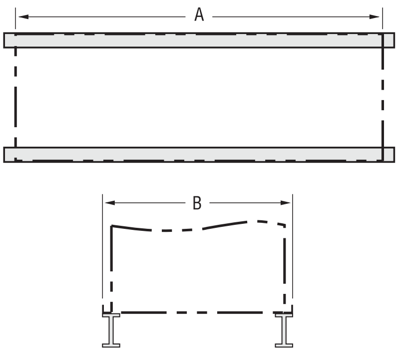


PMC-E Heater Sizes (kW)

Models	-18˚C	-29˚C	-40˚C
PMC-175E to PMC-240E	5	7	9
PMC-250E to PMC-375E	(2) 4	(2) 5	(2) 7
PMC-332E to PMC-530E	8	12	16
PMC-503E to PMC-792E	(2) 6	(2) 9	(2) 12
PMC-725E to PMC-1056E	(2) 8	(2) 12	(2) 15
PMC-1006E to PMC-1586E	(2) 12	(4) 9	(4) 12
PMC-376E to PMC-640E	10	15	20
PMC-568E to PMC-955E	(2) 7	(2) 12	(2) 15
PMC-715E to PMC-1013E	(2) 8	(2) 12	(2) 15
PMC-752E to PMC-1286E	(2) 9	(2) 15	(2) 18
PMC-1137E to PMC-1911E	(2) 15	(4) 10	(4) 15
PMC-1705E to PMC-2019E	(2) 15	(4) 12	(4) 15

Steel Support

The recommended support for EVAPCO condensers is structural I-beams located under the outer flanges and running the entire length of the unit. Mounting holes, 19mm in diameter are located in the bottom channels of the pan section to provide for bolting to the structural steel. (Refer to certified drawings from the factory for bolt hole locations.) Beams should be level to within 1.5mm in 1m before setting the unit in place. Do not level the unit by shimming between it and the I-beams as this will not provide proper longitudinal support.



PMC-E Dimensions

1.9m Wide Models	A	B
PMC-175E to 240E	3648	1930
250E to 375E	5490	1930
3m Wide Models	**A**	**B**
PMC-332E to 530E	3651	2991
503E to 792E	5490	2991
725E to 1056E	7337	2991
1006E to 1586E	11024	2991
3.6m Wide Models	**A**	**B**
PMC-376E to 640E	3651	3616
568E to 955E	5490	3616
715E to 1013E	6102	3616
752E to 1286E	7337	3616
1137E to 1911E	11024	3616
1705E to 2019E	12243	3616

Application

Design
EVAPCO units are heavy-duty construction and designed for long trouble-free operation. Proper equipment selection, installation and maintenance is, however, necessary to ensure good unit performance. Some of the major considerations in the application of a condenser are presented below. For additional information, contact the factory.

Air Circulation
In reviewing the system design and unit location, it is important that proper air circulation be provided. The best location is on an unobstructed roof top or on ground level away from walls and other barriers. Care must be taken when locating condensers in wells or enclosures or next to high walls. The potential for recirculation of hot, moist discharge air back into the fan intake exists. Recirculation raises the wet bulb temperature of the entering air causing the condensing pressure to rise above the design. For these cases, a discharge hood or ductwork should be provided to raise the overall unit height even with the adjacent wall, thereby reducing the chance of recirculation. Good engineering practice dictates that the evaporative condenser's discharge air not be directed or located close to or in the vicinity of building air intakes. Engineering assistance is available from the factory to identify potential recirculation problems and recommend solutions.

For additional information regarding layout of evaporative condensers, see the EVAPCO bulletin entitled ***Equipment Layout Manual***.

Piping
Condenser piping should be designed and installed in accordance with generally accepted engineering practice. All piping should be anchored by properly designed hangers and supports with allowance made for possible expansion and contraction. No external loads should be placed upon condenser connections, nor should any of the pipe supports be anchored to the unit framework. For additional information concerning refrigerant pipe sizing and layout, see the EVAPCO bulletin entitled ***Piping Evaporative Condensers***.

Maintaining the Recirculated Water System
The heat rejection in a condenser is accomplished by the evaporation of a portion of the recirculated spray water. As this water evaporates, it leaves behind all of its mineral content and impurities. These impurities and contaminants, which continue to recirculate in the system, must be controlled in order to avoid excessive concentration that can lead to corrosion, scale, and/or biological fouling.

Bleed or Blowdown
Each unit supplied with a pump mounted on the side is furnished with a clear bleed or blowdown line for visual inspection and a valve which, when fully open, will bleed off the proper amount of concentrated (cycled up) water from the system. If the makeup water supplying the unit is relatively free of impurities, it may be possible to cut back the bleed, but the unit must be checked frequently to make sure scale is not forming. Make up water pressure should be maintained between 140 and 340 kPa.

Water Treatment
In some cases the makeup will be so high in mineral content that a normal bleed or blowdown will not prevent scaling. In this case, water treatment will be required and a reputable water treatment company familiar with the local water conditions should be consulted.

Any chemical water treatment used must be compatible with the construction of the unit. If acid is used for treatment, it should be accurately metered and the concentration properly controlled. The pH of the water should be maintained between 6.5 and 8.0. **Units constructed of galvanized steel operating with circulating water having a pH of 8.3 or higher will require periodic passivation of the galvanized steel to prevent the formation of "white rust".**

Batch chemical feeding is not recommended because it does not afford the proper degree of control. If acid cleaning is required, extreme caution must be exercised and only inhibited acids recommended for use with galvanized construction should be used. For more information see the EVAPCO bulletin entitled **Maintenance Instructions**.

Control of Biological Contamination
Water quality should be checked regularly for biological contamination, If biological contamination is detected, a more aggressive water treatment and mechanical cleaning program should be undertaken. The water treatment program should be performed in conjunction with a qualified water treatment company. It is important that all internal surfaces be kept clean of accumulated dirt and sludge. In addition, the drift eliminators should be maintained in good operating condition.

Mechanical Specifications

Furnish and install, as shown on the plans, an EVAPCO model ____________ evaporative condenser. Each unit shall have condensing capacity of ____________ kW heat rejection, operating with ____________ refrigerant at _____ °C condensing temperature and _____ °C design wet bulb temperature.

IBC Compliance
The unit structure shall be designed, analyzed, and constructed in accordance with the latest edition of the International Building Code (IBC) Regulations for seismic loads up to _____ g and wind loads up to ____ kPa.

Pan and Casing
The pan and casing shall be constructed of G-235 hot-dip galvanized steel for long life and durability. The heat transfer section shall be removable from the pan to provide easy handling and rigging.

The pan/fan section shall include fans, motors and drives mounted and aligned at the factory. These itesm shall be located in the dry entering air stream to provide maximum service life and easy maintenaince. The pan bottom shall be sloped to the drain to ensure easy draining and to facilitate cleaning. Standard pan accessories shall include circular access doors, stainless steel strainers, wastewater bleed line with adjustable valve and brass makeup valve, with an unsinkable foam filled plastic float.

Power-Mizer Fan Drives
Fans shall be vane-axial type constructed of cast aluminum alloy blades. They shall be arranged in a two-stage system installed in a closely fitted cowl with venturi air inlet and air stabilizing vanes. Fan shaft bearings shall be a heavy-duty self-aligning ball type with grease fittings extended to the outside of the unit.

The fan drive shall be solid backed Power-Band constructed of neoprene with polyester cords designed for 150% of motor nameplate power. Drives are to be mounted and aligned at the factory.

Each fan shall be driven individually by a dedicated fan motor. Fan motors may be cycled independently without harmful moist air bypass.

Fan Motor
__________ kW totally enclosed fan cooled motor(s) shall be furnished suitable for outdoor service on __________ volts, __________ hertz, and __________ phase. Mortor(s) shall be mounted on an adjustable base.

Heat Transfer Coil
The coil(s) shall be all prime surface steel, encased in steel framework with the entire assembly hot-dip galvanized after fabrication. Coil(s) shall be designed with sloping tubes for free drainage of liquid refrigerant and shall be pneumatically tested at 2.69 MPa under water.

Water Distribution System
The system shall provide a water flow rate of 4 l/s over each square meter (6 GPM over each square foot) of the unit face area to ensure proper flooding of the coil. The spray header shall be constructed of schedule 40, PVC pipe for corrosion resistance. All spray branches shall be removable and include a threaded end plug for cleaning. The water shall be distributed over the entire coil surface by heavy-duty ABS spray nozzles with large 32mm diameter opening and internal sludge ring to eliminate clogging. Nozzles shall be threaded into a spray header to provide easy removal for maintenance.

Water Recirculation Pump
The pump(s) shall be a close-coupled, centrifugal type with mechanical seal, installed at the factory. ____________ kW totally enclosed, motor shall be furnished suitable for outdoor service on ____________ volts, ____________ hertz, and ____________ phase.

Eliminators
The eliminators shall be constructed entirely of inert polyvinyl chloride (PVC) in easily handled sections. The eliminator design shall incorporate three changes in air direction to assure complete removal of all entrained moisture from the discharge air stream. Maximum drift rate shall be less than 0.001% of the circulating water rate.

Finish
All pan and casing materials shall be constructed of G-235 heavy gauge mill hot-dip galvanized steel for maximum protection against corrosion. During fabrication, all panel edges shall be coated with 95% pure zinc-rich compound.

Notes

Notes

OUR PRODUCTS ARE MANUFACTURED WORLDWIDE.

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