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Saving Water by using Hybrid Evaporative Condensers

Evaporative cooling is the most energy efficient method of rejecting heat in an industrial process. Evaporative condensers utilize this technology for the refrigeration requirements in the food and beverage industry. Although it is energy efficient, potable water is consumed in the process. Recently, hybrid wet/dry technology has emerged that combines the energy efficiency of evaporative cooling and the water saving benefits of air cooled systems. This was made possible by EVAPCO's Ellipti-fin spiral fin and Arid fin pak dry coil technologies.

See the attached water saving analysis using two hybrid technologies. Burbank, CA is used as the location of a refrigerated warehouse. Product catalogs and two examples are provided with both showing significant water savings.

Additional submitted attachment is included below.



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June 1, 2015

Water Energy Technology (WET) Program

RE: EVAPCO Water Saving Hybrid Evaporative Condensers-eco-ATC-A and ATC-DC

Subject: Water savings analysis using local Burbank, CA data

EVAPCO manufactures energy and water saving evaporative condensers and has the ability to model water and energy use by application (i.e., dairy, warehouse), location based on local weather conditions and water quality .

We have made two product line selections, Selection 1 is the first step in water saving hybrid technology, Selection 2 is the most water efficient, with Selection 2 doubling the water savings.

Selection 1- (Estimated 597,391 gallons of water conserved annually, 13% water savings!)

Eco-ATC-558-A-1g hybrid condenser

5,880 MBH load, Ammonia Refrigerant, 95°F Condensing

Warehouse Distribution, located in Burbank, CA

3 Cycles of Concentration, **.0037USD/Gal water cost, .0041 USD/gal sewer**

The water savings results of using this condenser is **597,391 gallons** or a 13% water savings, And \$2,290 water cost savings on an annual basis.

Selection 2 –(Estimated 1,203,559 gallons of water conserved annually, 27% water savings!)

EVAPCO ATC-DC-1018M-25-2EF-1g wet/dry condenser

5,880 MBH load, Ammonia Refrigerant, 95°F condensing, Burbank/Glendale location, Warehouse Distribution, 3 cycles of concentration, **.0037 USD/gal potable water cost, .0041 USD/gal sewer.**

The results of using this condenser in lieu of an evaporative only design conserves an estimated 1,203,559 gallons of water (27% savings) and an estimated \$4,614 saved on water and sewage. This value could trend higher if cycles of concentration were increased based on a local potable water sample provided for analysis.

Committed to making life easier, more reliable and more sustainable for people everywhere.



Water and Energy Analysis: Water Savings Priority

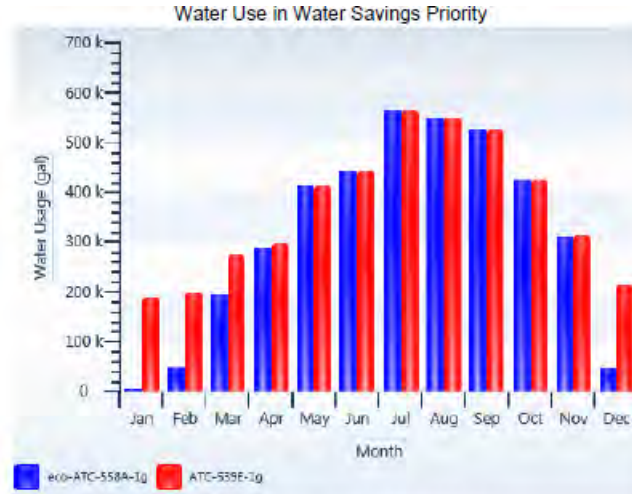
Date: 6/1/2015

eco-ATC-558A-1g vs. ATC-539E-1g

Project :
Equipment Ref.:

Selection Criteria

Refrigerant: NH3 Total Heat of Rejection (MBH): 5,880.00	Condensing Temp: 95 Dry Bulb Switchover (°F): 4.54 Wetbulb: 76.00
Selected Weather Station: BURBANK/GLENDALE Operational Profile: Warehouse Distribution Week Days: 5 Weekend Days: 2	Cycles of Concentration: 3 Water Cost: 0.0037 USD/gal Sewer Charges : 0.0041 USD/gal Energy Cost: 0.0981 USD/kWh



	ATC-539E-1g	eco-ATC-558A-1g	
	Total gal	Total gal	Water Saved
Jan	192,223	7,953	184,270
Feb	200,053	52,293	147,760
Mar	276,342	194,101	82,241
Apr	299,905	289,091	10,814
May	414,501	414,702	-201
Jun	446,545	446,491	54
Jul	567,444	566,915	529
Aug	551,417	550,854	563
Sep	529,739	529,413	326
Oct	425,473	425,525	-52
Nov	314,088	311,263	2,825
Dec	216,691	48,429	168,262
Total	4,434,421	3,837,030	597,391

	ATC-539E-1g	eco-ATC-558A-1g	Total Savings	
Estimated Total Usage (gal)	4,434,421	3,837,030	597,391	13%
Estimated Total Cost (USD)	16,999	14,709	2,290	13%

Water and energy use and costs are estimates only and are provided for the purpose of comparing the performance of evaporative condensers. Actual water/energy usage and costs will vary depending on weather, load profile, cycles of concentration and the control logic used to optimize system performance. Also, power, water and sewer costs are subject to local rates. The water and energy usage is calculated assuming a fixed condensing temperature and the use of variable frequency drives. Projected energy use is for evaporative condensers only, not total refrigeration system energy use. The Temperature Profile generated to estimate water and energy usage is based on 5 Year weather data from the National Climatic Data Center (NCDC). Load profiles utilized in the program are based on industrial refrigeration applications and have been provided courtesy of Cascade Energy- Portland, OR.



Water and Energy Analysis: Water Savings Priority

Date: 5/28/2015

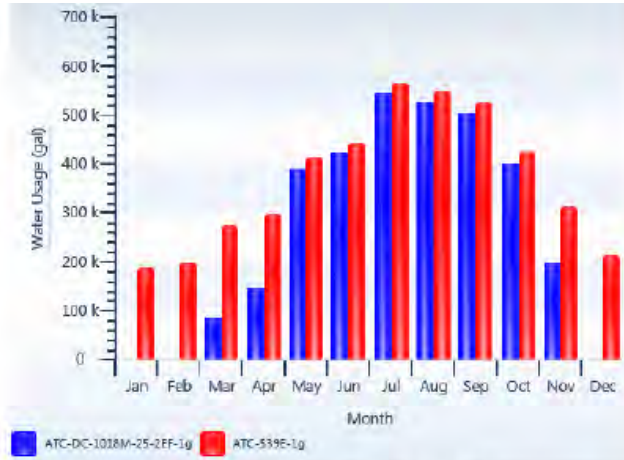
ATC-DC-1018M-25-2EF-1g vs. ATC-539E-1g

Project :

Equipment Ref.:

Selection Criteria

Refrigerant: NH3 Total Heat of Rejection (MBH): 5,880.00	Condensing Temp: 95 Dry Bulb Switchover (°F): 28.17 Wetbulb: 76.00
Selected Weather Station: BURBANK/GLENDALE Operational Profile: Warehouse Distribution Week Days: 5 Weekend Days: 2	Cycles of Concentration: 3 Water Cost: 0.0037 USD/gal Sewer Charges : 0.0041 USD/gal Energy Cost: 0.0981 USD/kWh



	ATC-539E-1g	ATC-DC-1018M-25-2EF-1g	Water Saved
	Total gal	Total gal	
Jan	192,223	0	192,223
Feb	200,053	0	200,053
Mar	276,342	86,427	189,915
Apr	299,905	145,657	154,248
May	414,501	389,857	24,644
Jun	446,545	423,366	23,179
Jul	567,444	545,859	21,585
Aug	551,417	528,769	22,648
Sep	529,739	507,120	22,619
Oct	425,473	402,351	23,122
Nov	314,088	201,456	112,632
Dec	216,691	0	216,691
Total	4,434,421	3,230,862	1,203,559

	ATC-539E-1g	ATC-DC-1018M-25-2EF-1g	Total Savings	
Estimated Total Usage (gal)	4,434,421	3,230,862	1,203,559	27%
Estimated Total Cost (USD)	16,999	12,385	4,614	27%

Water and energy use and costs are estimates only and are provided for the purpose of comparing the performance of evaporative condensers. Actual water/energy usage and costs will vary depending on weather, load profile, cycles of concentration and the control logic used to optimize system performance. Also, power, water and sewer costs are subject to local rates. The water and energy usage is calculated assuming a fixed condensing temperature and the use of variable frequency drives. Projected energy use is for evaporative condensers only, not total refrigeration system energy use. The Temperature Profile generated to estimate water and energy usage is based on 5 Year weather data from the National Climatic Data Center (NCDC). Load profiles utilized in the program are based on industrial refrigeration applications and have been provided courtesy of Cascade Energy- Portland, OR.



NEW!

ATC-DC

INDUSTRIAL CONDENSERS

FEATURING
ARID fin Pak™
DRY COIL
HEAT TRANSFER TECHNOLOGY



Shown with Optional
Pulse~Pure
Water Treatment System

Available with Optional
evapco
SMART SHIELD™
Water Treatment System

ENGINEERED FOR EFFICIENT DRY PERFORMANCE

MAXIMUM WATER SAVINGS!



IARW International Association of Refrigerated Warehouses

Member of
iiar
International Institute of Ammonia Refrigeration
www.iiar.org

MEMBER OF
AIRRI
Air-Conditioning, Heating and Refrigeration Institute



ATC-DC Dry Performance



Since its founding in 1976, EVAPCO, Incorporated has become an industry leader in the engineering and manufacturing of quality heat transfer products around the world. EVAPCO's mission is to provide first class service and quality products for the following markets:

- Industrial Refrigeration
- Commercial HVAC
- Industrial Process
- Power

EVAPCO's powerful combination of financial strength and technical expertise has established the company as a recognized manufacturer of market-leading products on a worldwide basis. EVAPCO is also recognized for the superior technology of their environmentally friendly product innovations in sound reduction and water management.

EVAPCO is an employee owned company with a strong emphasis on research & development and modern manufacturing plants. EVAPCO has earned a reputation for technological innovation and superior product quality by featuring products that are designed to offer these operating advantages:

- Higher System Efficiency
- Environmentally Friendly
- Lower Annual Operating Costs
- Reliable, Simple Operation and Maintenance

With an ongoing commitment to Research & Development programs, EVAPCO provides the most advanced products in the industry – **Technology for the Future, Available Today!**

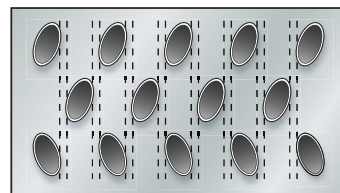


EVAPCO products are manufactured in 19 locations in 9 countries around the world and supplied through a sales network consisting of over 180 offices.

Evolution of Heat Transfer Technology

EVAPCO has a long standing commitment to heat transfer research and development. This commitment has resulted in a number of advancements in heat transfer coil design. Up until the mid-1980's, evaporative condensers were manufactured with tightly packed round tube coils. Through thousands of hours of testing and research, EVAPCO developed the Thermal Pak® coil. The Thermal Pak® coil was patented in 1987, (now expired), and changed the thinking of system design engineers by changing the shape of the coil tubes. The elliptical tube design maximized the effective tube surface area while lowering airside pressure drop and allowing for higher water loading. The combination of the elliptical shape tube in the Thermal Pak® orientation increased heat transfer efficiency and resulted in one of the highest capacities per plan area of evaporative condensers available today.

Throughout the late 1980's and into the 1990's EVAPCO was continuously looking for ways to improve heat transfer efficiency. This research resulted in the development of the Thermal Pak® II heat transfer coil. The Thermal Pak® II coil utilized the same elliptical shape tube introduced in the original Thermal Pak coil, but changed the orientation of the tubes to improve the tubes air to water interface for increased heat transfer efficiency.



Thermal-Pak® II Coil by EVAPCO

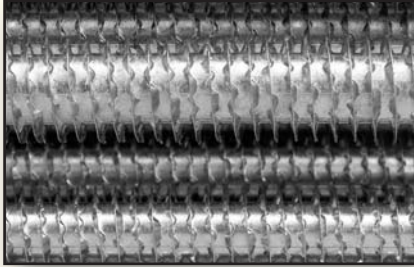
Research and development is an on-going process at EVAPCO. Through the success of the Thermal Pak II coil, EVAPCO saw the potential for new coil configurations and the need for new manufacturing technology to improve processes and efficiency. During this same time, it became evident that a need exists for more environmentally conscious cooling products.

The combination of EVAPCO's R&D, manufacturing and environmental commitment has resulted in the development of **Ellipti-fin®** Coil Heat Transfer Technology.

The **Ellipti-fin®** coil utilizes elliptical shape tube with extended surface fins for maximum heat transfer efficiency. **The extended surface increases the heat transfer efficiency in the evaporative or wet mode as well as the dry mode of operation.**

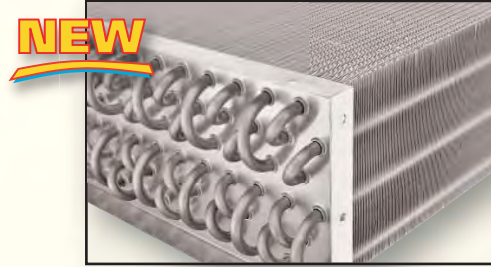
Powered by Innovative Coil Technology

ELLIPTI-*fin*[®] Heat Transfer Coil

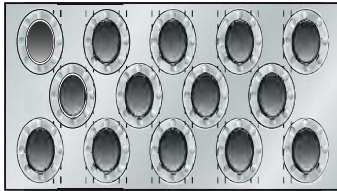


- Elliptical Tubes with Spiral Wound Fins
- Improved Dry and Wet Operation
- All Rows Finned
- Hot-Dip Galvanized Steel
- Nitrogen Charged Before Shipment

ARID *fin Pak*[™] Dry Cooling Coil



- Superior Dry Heat Transfer
- 5/8" Type 304L Stainless Steel Tubes
- Marine Grade Aluminum Fins
- Hydraulically Expanded
- Nitrogen Charged Before Shipment



ELLIPTI-*fin*[®] Finned Elliptical Tube by EVAPCO (Patent Pending)

The **ELLIPTI-*fin***[®] coil incorporates features of both the Thermal Pak and Thermal Pak II coils as the tubes are oriented vertically yet spaced so as not to increase the airside pressure drop. As such, ATC-DC condensers are not subject to the performance penalties normally associated with round tube extended surface coils.

ELLIPTI-*fin*[®] coils are manufactured from high quality carbon steel tubing following the most stringent quality control procedures and in accordance with the ASME B31.5 Refrigerant Piping Code. Each circuit is inspected to assure the material quality and tested before fins are wound onto the surface of the tube. Each circuit is then assembled into a complete coil. Finally, the assembled coil is tested at 390 P.S.I.G. air pressure under water to make sure it is leak free. To protect the coil against corrosion, and complete the bond between tube and fin, the entire assembly is dipped in molten zinc (hot dip galvanized) at a temperature of approximately 800°F.

The **ELLIPTI-*fin***[®] coil design utilizes counterflow heat transfer. The rows of the finned elliptical tubes are positioned vertically in the direction of airflow to enhance turbulence, which increases heat transfer while minimizing airside pressure drop. The design features of EVAPCO's **ELLIPTI-*fin***[®] condensing coils ensure the end-user will receive maximized evaporative heat transfer efficiency wet or dry.

NEW ARID *fin Pak*[™] Dry Cooling Coil

ARID *fin Pak*[™] Dry Cooling Coils are constructed with 5/8" diameter type 304L stainless steel tubing and marine-grade aluminum fins. The stainless steel tubing meets the requirements of ASME B31.5 refrigerant piping code. The standard **ARID *fin Pak***[™] Dry Cooling Coils are designed with a fin density of 10 fins per inch for maximum heat transfer efficiency in the smallest plan area. Optional fin densities are available (Consult the factory for selections and pricing).

The SST 304L round tubes are fit into the aluminum fin plate and hydraulically expanded. EVAPCO's precisely controlled hydraulic expansion process results in more consistent contact between the tube and fin plate than conventional mechanical expansion methods. The entire **ARID *fin Pak***[™] Dry Cooling Coil is pressure tested to 390 psig, evacuated and nitrogen charged prior to final assembly and shipment.



NEW ATC-DC Design and Construction Features

The ATC-DC line of evaporative condensers represents EVAPCO's newest advancement in thermal heat transfer research and development. Utilizing the NEW ARID *fin Pak*™ heat transfer coil, the ATC-DC offers improved heat transfer during dry operation and significant water savings due to extended periods of dry operation. The ATC-DC is the latest example in EVAPCO's on-going commitment to quality, environmentally friendly products.

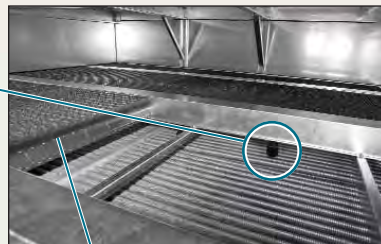


PVC Spray Distribution Header with ZM® II Nozzles

- Large orifice nozzles prevent clogging (no moving parts).
- Redesigned nozzles for superior water distribution.
- Nozzles are threaded into header at proper orientation.
- Fixed position nozzles require zero maintenance.
- Threaded end caps for ease of cleaning.
- Guaranteed for life.

Self Supporting Service Platforms (Optional)

- Dual platform arrangement provides access to wet/dry coils and drive system.
- Includes access ladders - field installed.



Water Saver Drift Eliminators

- Patented design reduces drift rate to 0.001%.
- Made from corrosion resistant PVC for long life.
- Prevents water droplets from contacting Arid-*fin Pak*™ coil.

U.S. Patent No. 6,315,804

Air Inlet Access Door (Optional)

- Increased ease of access to basin.
- Hinged access panel with quick release mechanism.
- Not available on all models.



WST Framed Inlet Louvers (Water and Sight Tight)

- Framed for easy handling, tighter fit and longer life
- Design keeps sunlight out – preventing biological growth.
- Keeps water in while keeping dirt and debris out.



"Clean Pan" Basin Design

- Access from all four sides.
- Large open area simplifies maintenance.
- Basin may be inspected with pumps running.
- Sloped basin design prevents sediment buildup, biological film and standing water.



Super Low Sound Fan (Optional)

- 9-15 dB(A) sound reduction.
- Extremely wide chord fan blades for sound sensitive applications.
- One piece molded heavy duty construction.

Advanced Drive System Design

- Totally Enclosed Fan Motors assures Long Life.
- Power-Band Belts for Better Lateral Rigidity.
- Advanced Design Aluminum Fan Blades.
- Non-corroding Cast Aluminum Sheaves.
- Heavy-Duty Fan Shaft Bearings with L-10 Life of 75,000 - 135,000 hrs.
- All Other Components Corrosion Resistant Materials.
- All Components Covered by 5 Year Warranty.



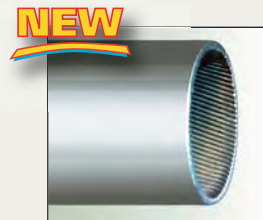
ARID fin Pak™ Heat Transfer Technology

- Type 304L stainless steel tube/aluminum fin coil located above drift eliminators.
- Designed to operate in dry mode for an extended period.
- High heat transfer efficiency.



Ellipti-fin® Heat Transfer Technology

- Features EVAPCO's exclusive **CROSSCOOL™** tube enhancement for greater internal heat transfer.
 - Thermal Pak® coil with extended surface.
 - Water savings through extended periods of dry operation.
 - High heat transfer efficiency.
 - Low refrigerant charge.
- Patent Pending



CROSSCOOL™

Unique Field Seam

- Eliminates up to 66% of fasteners.
- Self guiding channels improve quality of field seam to reduce leaks.
- Easy to install.
- Lower installation cost.



Totally Enclosed Pump Motors

- Help assure long, trouble-free operation.



Non-Chemical Water Treatment (Optional)

- Scale, corrosion and bacteria control.
- Factory mounted with single source responsibility.
- Environmentally safe, chemical-free water treatment.

U.S. Patent No. 7,704,364



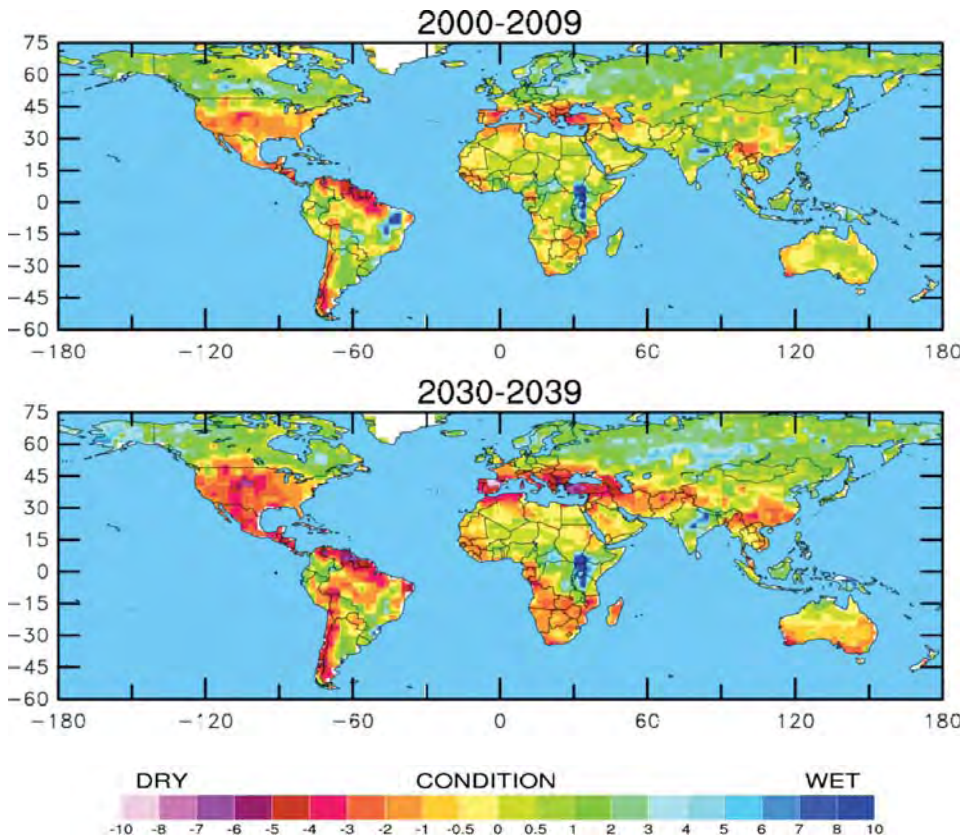
Solid Chemistry Water Treatment (Optional)

- Controlled release chemistry provides uniform treatment over a 30 day period.
- Factory mounted and wired.
- Easier and safer, eliminates the potential for liquid spills.

U.S. Patent No. 8,398,850

Future Drought Projections Worldwide

The frequency and persistence of global drought conditions is not expected to change with current climatic conditions. The maps below illustrate the *potential* for future drought worldwide over the decades indicated, based on current projections of future greenhouse gas emissions.¹ It is quite clear that by 2030 drought conditions will be severe if no action is taken NOW to reduce water use.



Maps are not intended as forecasts, since the actual course of projected greenhouse gas emissions as well as natural climate variations could alter the drought patterns.²

ATC-DC Industrial Condensers are an example of EVAPCO's corporate commitment to protect the world's valuable potable water resources. The ATC-DC product line incorporates the latest research and development in heat transfer technologies.

¹ Based on a study released by the National Center for Atmospheric Research (NCAR) titled "Drought under Global Warming: A Review", by Aiguo Dai, a leading climatologist.

² The scale used to measure drought on these maps is the Palmer Drought Severity Index, which assigns positive numbers when conditions are unusually wet for a particular region, and negative numbers when conditions are unusually dry. A reading of -4 or below is considered extreme drought. Regions that are blue or green will likely be at lower risk of drought, while those in the red and purple spectrum could face more unusually extreme drought conditions.

ATC-DC *Water Saving Technology*

Engineered for Efficient Dry Performance to Meet Future Global Climate Change and Water Use Restrictions

Significant Water Savings

The **ARID fin Pak™** Dry Coil combined with EVAPCO's **Ellipti-fin®** coil technology enables the ATC-DC to be operated in a 100% Dry Mode at a significantly higher switchover temperature than that of a typical bare tube coil evaporative condenser. This leads to a much higher number of hours per year the condenser can operate in dry mode (spray pumps off), thus significantly reducing annual water consumption. This combination of heat transfer technologies makes the ATC-DC the most water efficient EVAPCO condenser.

Consider a meat processing plant application near Wichita, KS where a condenser is required to reject a constant heat load of approximately 400 tons of refrigeration at a 95°F condensing temperature and a summer design wet bulb temperature of 78°F. The process operates 24 hours a day 7 days a week.

The ATC-E evaporative condenser, the eco-ATC-A and the new ATC-DC evaporative condenser are compared as follows:

Model Comparison

Model	ATC-559E	eco-ATC-562A	ATC-DC-1218M-35-2EF
Plan Area	12' x 12'	12' x 18'	12' x 18'
Fan Motor	30 hp	30 hp	30 hp
Pump Motor	5 hp	7.5 hp	7.5 hp

Dry Operation Performance Comparison

Model No.	Design TR (R-717)*	Dry Bulb Switch Point (°F) (% Design TR)		
		100%	75%	50%
		409TR	307TR	205TR
ATC-559E	397	-29.3	1.2	32.3
eco-ATC-562A	399	-1.7	21.2	46.6
ATC-DC-1218M-35-2EF	409	45	57	70

Every model in the ATC-DC product line has been engineered to provide a minimum of 50% of the design heat rejection (MBH) at 60°F ambient dry bulb temperature or higher, based on maintaining 96.3°F condensing temperature.

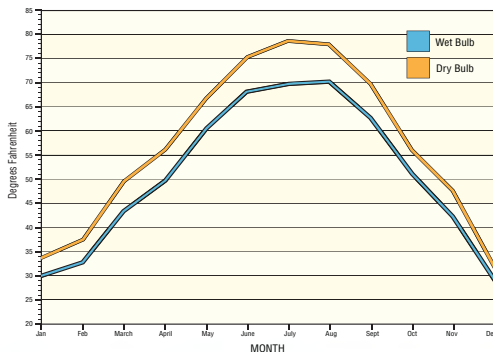


ATC-DC Water Saving Technology

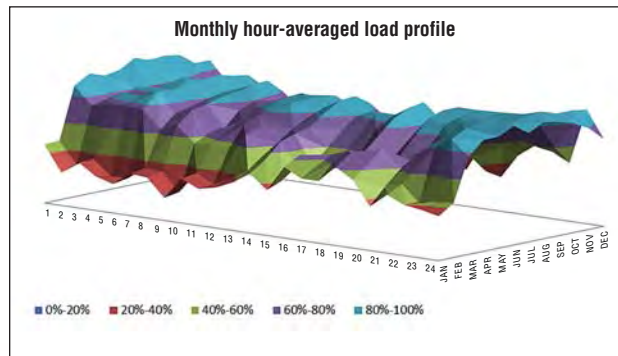
ATC-DC Water Saving Analysis

Utilizing the Water & Energy Savings Calculator in evapSelect with required key inputs:

Monthly Average Ambient Temperature
Wichita, KS



Load Profile: Meat Processing



Weather Station: For Wichita, KS, the selected weather station is McConnell AFB
The Temperature Profile generated to estimate water and energy usage is based on 5 year weather data from the National Climatic Data Center (NCDC). The weather data shown above was collected from MC CONNELL AFB, USA
For more information visit: <http://www.ncdc.noaa.gov/oa/ncdc.html>

Meat Processing
Profile Provided Courtesy of Cascade Energy

Cycles of Concentration: Historical water analysis for Wichita, KS is on average 4 cycles
Profile Days: 5 Week Days, and 2 Weekend Days
Potable Water Cost for Wichita: Estimated at .0028 \$/gal
Waste Water Treatment Costs for Wichita: Estimated at .0031 \$/gal
Power Costs: Estimated at .0637 \$/kwh

Water and Energy Analysis *			
Selected Weather Station: McConnell AFB		Load Profile: Beef	
Condensing Temperature: 96.30		Week Days: 5	
Wet Bulb: 78.00		Weekend Days: 2	
Refrigerant: NH3		Cycles of Concentration: 4	
Model Description:	ATC-559E	eco-ATC-562A	ATC-DC-1218M-35-2EF
Quantity:	1.00	1.00	1.00
Dry Bulb Switchover(°F)	-28.42	1.22	45.00
Total Water Usage per year (gal.)	3,598,010	3,245,607	733,372
Total Water Cost per year (USD)	23,271	20,992	4,710
Total Energy Usage per year (kWh)	51,777	59,433	52,064
Total Energy Cost per year (USD)	3,298	3,786	3,316
Total Estimated Operating Cost	\$26,569	\$24,778	\$8,026

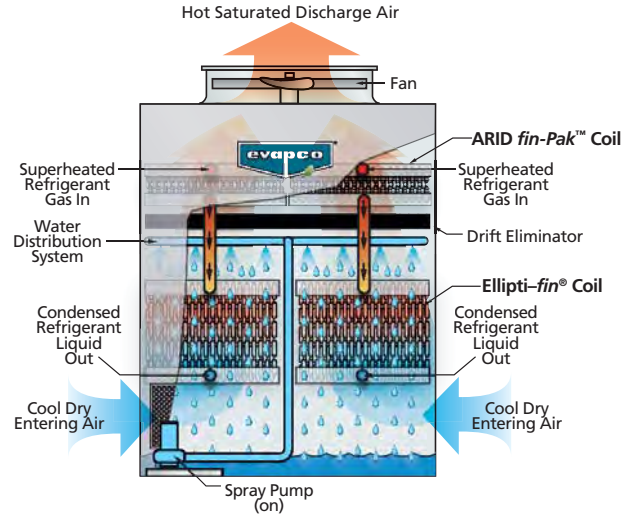
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ATC-DC Design Features *ATC-DC Dry Performance Powered by Innovative Coil Technology*

Principle of Operation

Evaporative (Wet) Mode – Spray Pump(s) Energized

The refrigerant gas is discharged from the compressor into the inlet of the **ARID *fin Pak*™ Dry Coil** which is positioned in the discharge air stream above the unit's drift eliminators and below the fan section. Ambient air is drawn into the unit, by the condenser's fans, through inlet louvers located in the lower section above the water basin. The air is drawn upward through the wet coil into the drift eliminators (which remove entrained water droplets from the air stream) and into the **ARID *fin Pak*™ Dry Coil**. Heat from the refrigerant gas is transferred to the air as it comes into contact with the tubes and densely packed fins of the **ARID *fin Pak*™ Dry Coil**. The refrigerant gas exits the **ARID *fin Pak*™ Dry Coil** and travels via inter-connecting piping (by others) to the inlet of the **Ellipti-*fin*® Coil** located in the lower section of the ATC-DC Condenser. Water from the condenser's sump is circulated over the wet coil as the ambient air is simultaneously drawn into the unit and travels up through the **Ellipti-*fin*®**. A portion of the spray water is evaporated into the air stream as it travels through the wet coil. This evaporative process cools the spray water, which in turn cools the coil tubes and extended surface fins. The cool tube walls and extended surface fins cause the refrigerant gas to give up heat and condense into a liquid. The condensed liquid flows out of the **Ellipti-*fin*®** to the high pressure receiver for return to the system. The water which has not evaporated falls into the sump and is recirculated by the spray pump to the water distribution system located above the **Ellipti-*fin*®**.



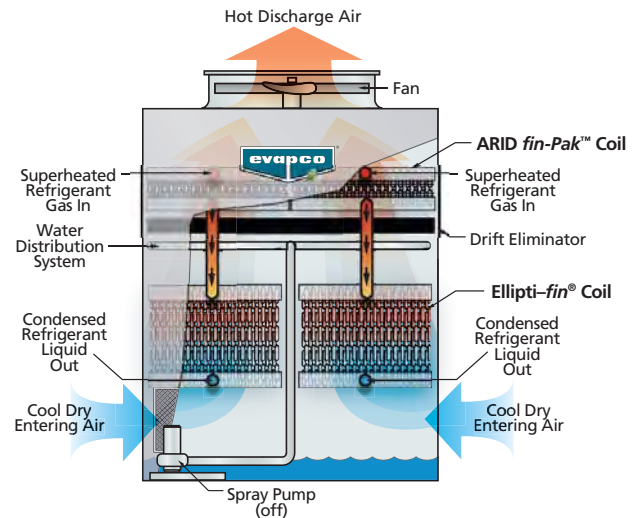
ATC-DC Evaporative Mode

The amount of water consumed during this mode of operation is a function of the amount of heat rejected. Water consumption includes the volume of water which is evaporated during the cooling process and the amount of water which is discharged (referred to as “blow-down”) to maintain the required cycles of concentration in order to meet water quality guidelines.

Dry Mode – Spray Pump De-energized

The refrigerant gas is discharged from the compressor into the inlet of the **ARID *fin Pak*™ Dry Coil** which is positioned in the dry air stream above the unit's drift eliminators and below the fan section. Ambient air is drawn into the unit by the condenser's fans, through inlet louvers located in the lower section above the water basin. The air is drawn upward through the **Ellipti-*fin*®** into the **ARID *fin Pak*™ Dry Coil** above. Heat from the refrigerant gas is transferred to the air as it comes into contact with the tubes and densely packed fins of the **ARID *fin Pak*™ Dry Coil**. The refrigerant gas exits the **ARID *fin Pak*™ Dry Coil** and travels via the inter-connecting piping to the inlet of the **Ellipti-*fin*®**. The ambient air entering the unit travels upward through the **Ellipti-*fin*® Coil** which in turn cools the coil tubes and extended surface fins. The cool tube walls and extended surface fins cause the refrigerant gas to give up heat and condense into a liquid. The condensed liquid flows out of the **Ellipti-*fin*®** to the high pressure receiver for return to the system.

There is **NO WATER** consumed during this mode of operation.



ATC-DC Dry Mode



ATC-DC Dry Operation Performance Data

Model No.	Design TR (R-717)*	Dry Bulb Switch Point (°F) (% Design TR)		
		100%	75%	50%
ATC-DC-99H-25-1EF	96	52	62	74
ATC-DC-99H-35-1EF	98	56	65	76
ATC-DC-99I-25-1EF	103	52	62	74
ATC-DC-99I-35-1EF	105	56	66	76
ATC-DC-99J-25-1EF	112	51	62	73
ATC-DC-99J-35-1EF	114	56	66	76
ATC-DC-99H-25-2EF	127	41	54	68
ATC-DC-99H-35-2EF	129	44	56	70
ATC-DC-99I-25-2EF	135	41	54	68
ATC-DC-99I-35-2EF	137	45	57	70
ATC-DC-99J-25-2EF	148	41	54	68
ATC-DC-99J-35-2EF	151	45	57	70
ATC-DC-912I-25-1EF	130	52	62	74
ATC-DC-912I-35-1EF	132	55	65	76
ATC-DC-912J-25-1EF	144	51	62	73
ATC-DC-912J-35-1EF	147	55	65	76
ATC-DC-912K-25-1EF	151	51	62	73
ATC-DC-912K-35-1EF	154	56	66	76
ATC-DC-912I-25-2EF	171	41	54	68
ATC-DC-912I-35-2EF	174	43	56	69
ATC-DC-912J-25-2EF	189	40	54	68
ATC-DC-912J-35-2EF	193	44	56	70
ATC-DC-912K-25-2EF	199	41	54	68
ATC-DC-912K-35-2EF	203	45	57	70
ATC-DC-914J-25-1EF	160	52	62	74
ATC-DC-914J-35-1EF	163	56	66	76
ATC-DC-914K-25-1EF	170	52	62	74
ATC-DC-914K-35-1EF	173	56	66	76
ATC-DC-914I-25-2EF	192	41	54	68
ATC-DC-914I-35-2EF	196	43	56	69
ATC-DC-914J-25-2EF	211	41	54	68
ATC-DC-914J-35-2EF	215	44	57	70
ATC-DC-914K-25-2EF	223	41	55	68
ATC-DC-914K-35-2EF	227	45	57	70
ATC-DC-918H-25-1EF	200	51	62	73
ATC-DC-918H-35-1EF	203	54	64	75
ATC-DC-918I-25-1EF	214	50	61	73
ATC-DC-918I-35-1EF	218	55	65	75
ATC-DC-918J-25-1EF	232	50	61	73
ATC-DC-918J-35-1EF	237	55	65	75
ATC-DC-918H-25-2EF	262	39	53	67
ATC-DC-918H-35-2EF	267	42	55	69
ATC-DC-918I-25-2EF	283	39	53	67
ATC-DC-918I-35-2EF	288	42	55	69
ATC-DC-918J-25-2EF	306	40	53	68
ATC-DC-918J-35-2EF	311	44	56	70
ATC-DC-921H-25-1EF	229	48	60	72
ATC-DC-921H-35-1EF	234	52	62	74
ATC-DC-921I-25-1EF	245	48	60	72
ATC-DC-921I-35-1EF	249	52	63	74
ATC-DC-921J-25-1EF	266	48	60	72
ATC-DC-921J-35-1EF	272	53	63	74
ATC-DC-921H-25-2EF	302	36	51	66
ATC-DC-921H-35-2EF	307	38	52	67
ATC-DC-921I-25-2EF	322	37	51	66
ATC-DC-921I-35-2EF	328	39	53	67
ATC-DC-921J-25-2EF	351	37	51	66
ATC-DC-921J-35-2EF	358	41	54	68
ATC-DC-1712I-25-1EF	259	56	66	76
ATC-DC-1712I-35-1EF	264	57	66	76
ATC-DC-1712J-25-1EF	288	56	66	76
ATC-DC-1712J-35-1EF	293	58	67	77
ATC-DC-1712K-25-1EF	302	57	66	76
ATC-DC-1712K-35-1EF	308	58	67	77
ATC-DC-1712I-25-2EF	338	41	54	68
ATC-DC-1712I-35-2EF	344	44	56	70
ATC-DC-1712K-25-2EF	393	41	55	68
ATC-DC-1712K-35-2EF	401	45	58	70
ATC-DC-1714J-25-1EF	320	52	62	74
ATC-DC-1714J-35-1EF	326	56	66	76
ATC-DC-1714K-25-1EF	340	52	62	74
ATC-DC-1714K-35-1EF	346	56	66	76
ATC-DC-1714I-25-2EF	377	42	55	69
ATC-DC-1714I-35-2EF	384	44	57	70
ATC-DC-1714J-25-2EF	412	42	55	69
ATC-DC-1714J-35-2EF	420	45	58	70
ATC-DC-1714K-25-2EF	437	43	55	69
ATC-DC-1714K-35-2EF	446	46	58	71

Model No.	Design TR (R-717)*	Dry Bulb Switch Point (°F) (% Design TR)		
		100%	75%	50%
ATC-DC-1012I-25-1EF	190	37	51	66
ATC-DC-1012I-35-1EF	194	41	54	68
ATC-DC-1012J-25-1EF	209	36	51	66
ATC-DC-1012J-35-1EF	213	42	55	69
ATC-DC-1012K-25-1EF	221	36	51	66
ATC-DC-1012K-35-1EF	225	42	55	69
ATC-DC-1012L-25-1EF	230	36	51	66
ATC-DC-1012L-35-1EF	235	43	56	69
ATC-DC-1012I-25-2EF	230	27	44	61
ATC-DC-1012I-35-2EF	235	30	46	63
ATC-DC-1012J-25-2EF	252	28	44	61
ATC-DC-1012J-35-2EF	257	31	47	63
ATC-DC-1012K-25-2EF	266	28	45	62
ATC-DC-1012K-35-2EF	272	33	48	64
ATC-DC-1012L-25-2EF	278	29	45	62
ATC-DC-1012L-35-2EF	283	34	49	65
ATC-DC-1018I-25-1EF	247	40	54	68
ATC-DC-1018I-35-1EF	252	44	56	70
ATC-DC-1018J-25-1EF	273	40	54	68
ATC-DC-1018J-35-1EF	278	44	57	70
ATC-DC-1018K-25-1EF	292	40	53	68
ATC-DC-1018K-35-1EF	297	45	57	70
ATC-DC-1018L-25-1EF	308	40	53	68
ATC-DC-1018L-35-1EF	314	45	57	70
ATC-DC-1018M-25-1EF	320	39	53	67
ATC-DC-1018M-35-1EF	326	45	57	70
ATC-DC-1018I-25-2EF	298	31	47	63
ATC-DC-1018I-35-2EF	303	33	48	64
ATC-DC-1018J-25-2EF	328	32	47	64
ATC-DC-1018J-35-2EF	334	34	49	65
ATC-DC-1018K-25-2EF	352	32	47	64
ATC-DC-1018K-35-2EF	359	35	50	65
ATC-DC-1018L-25-2EF	371	32	47	64
ATC-DC-1018L-35-2EF	378	35	50	65
ATC-DC-1018M-25-2EF	385	32	47	64
ATC-DC-1018M-35-2EF	392	36	50	66
ATC-DC-1024I-25-1EF	380	37	51	66
ATC-DC-1024I-35-1EF	387	41	54	68
ATC-DC-1024J-25-1EF	418	36	51	66
ATC-DC-1024J-35-1EF	426	42	55	69
ATC-DC-1024K-25-1EF	442	36	51	66
ATC-DC-1024K-35-1EF	451	42	55	69
ATC-DC-1024L-25-1EF	461	36	51	66
ATC-DC-1024L-35-1EF	469	43	56	69
ATC-DC-1024I-25-2EF	459	27	44	61
ATC-DC-1024I-35-2EF	467	30	46	63
ATC-DC-1024J-25-2EF	459	28	44	61
ATC-DC-1024J-35-2EF	467	31	47	63
ATC-DC-1024K-25-2EF	533	28	45	62
ATC-DC-1024K-35-2EF	543	33	48	64
ATC-DC-1024L-25-2EF	555	29	45	62
ATC-DC-1024L-35-2EF	566	34	49	65
ATC-DC-1036I-25-1EF	495	40	54	68
ATC-DC-1036I-35-1EF	504	44	56	70
ATC-DC-1036J-25-1EF	545	40	54	68
ATC-DC-1036J-35-1EF	555	44	57	70
ATC-DC-1036K-25-1EF	583	40	53	68
ATC-DC-1036K-35-1EF	594	45	57	70
ATC-DC-1036L-25-1EF	615	40	53	68
ATC-DC-1036L-35-1EF	627	45	57	70
ATC-DC-1036M-25-1EF	640	39	53	67
ATC-DC-1036M-35-1EF	652	45	57	70
ATC-DC-1036I-25-2EF	595	34	49	65
ATC-DC-1036I-35-2EF	607	34	49	65
ATC-DC-1036J-25-2EF	656	36	50	65
ATC-DC-1036J-35-2EF	668	35	50	65
ATC-DC-1036K-25-2EF	704	36	51	66
ATC-DC-1036K-35-2EF	717	36	51	66
ATC-DC-1036L-25-2EF	743	37	51	66
ATC-DC-1036L-35-2EF	757	37	51	66
ATC-DC-1036M-25-2EF	771	37	51	66
ATC-DC-1036M-35-2EF	786	38	52	67

* Tons at standard conditions: 96.3°F condensing, 20°F suction and 78°F W.B.



Engineering Dimensions & Data

ATC-DC-1018I-25-1EF to ATC-DC-1018M-35-2EF

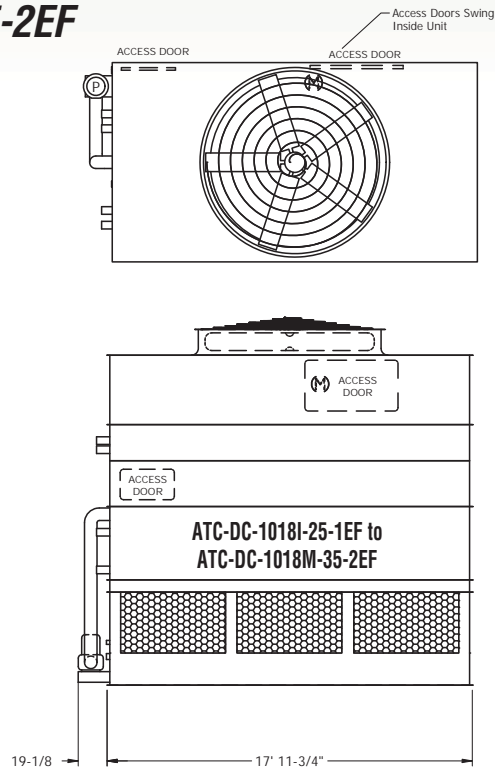
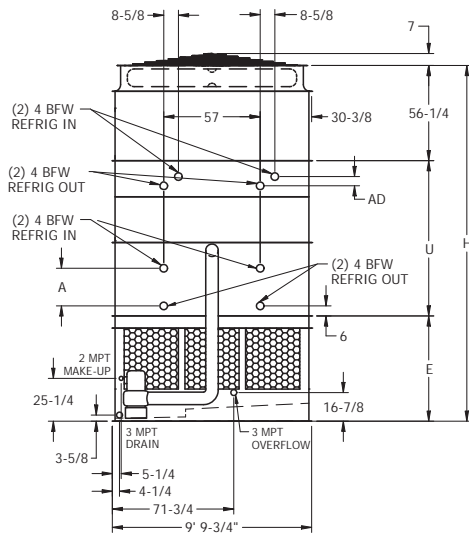


Table 9 Engineering Data

Model No.	R-717 Tons*		Fans		Weights†			Refrigerant Op. Charge (lbs.)***	Coil Volume ft³	Spray Pump		Remote Sump		Dimensions					
	Wet Capacity	Dry Capacity @ 60°F DB Switch Point	HP	CFM	Shipping	Heaviest Section†	Operating			HP	GPM	Gallons Req'd**	Conn. Size	Operating Weight (lbs)	Height H	Lower E	Middle U	Wet Coil A	Dry Coil AD
ATC-DC-1018I-25-1EF	247	154	10	72,600	19,030	11,930	26,870	167	46	7.5	1030	630	12"	21,360	16' 1-5/8"	5' 2-1/4"	6' 3"	5-1/2"	5-1/2"
ATC-DC-1018J-25-1EF	252	167	10	71,800	20,160	13,060	28,020	180	59	7.5	1030	630	12"	22,510	16' 1-5/8"	5' 2-1/4"	6' 3"	5-1/2"	6-7/8"
ATC-DC-1018J-35-1EF	273	169	15	83,100	19,170	11,930	27,010	167	46	7.5	1030	630	12"	21,490	16' 1-5/8"	5' 2-1/4"	6' 3"	5-1/2"	5-1/2"
ATC-DC-1018J-35-1EF	278	186	15	82,200	20,300	13,060	28,150	180	59	7.5	1030	630	12"	22,640	16' 1-5/8"	5' 2-1/4"	6' 3"	5-1/2"	6-7/8"
ATC-DC-1018K-25-1EF	292	181	20	91,400	19,230	11,930	27,070	167	46	7.5	1030	630	12"	21,560	16' 1-5/8"	5' 2-1/4"	6' 3"	5-1/2"	5-1/2"
ATC-DC-1018K-35-1EF	297	201	20	90,500	20,360	13,060	28,220	180	59	7.5	1030	630	12"	22,710	16' 1-5/8"	5' 2-1/4"	6' 3"	5-1/2"	6-7/8"
ATC-DC-1018L-25-1EF	308	189	25	98,500	19,260	11,930	27,100	167	46	7.5	1030	630	12"	21,590	16' 1-5/8"	5' 2-1/4"	6' 3"	5-1/2"	5-1/2"
ATC-DC-1018L-35-1EF	314	212	25	97,500	20,390	13,060	28,250	180	59	7.5	1030	630	12"	22,740	16' 1-5/8"	5' 2-1/4"	6' 3"	5-1/2"	6-7/8"
ATC-DC-1018M-25-1EF	320	196	30	104,700	19,310	11,930	27,150	167	46	7.5	1030	630	12"	21,640	16' 1-5/8"	5' 2-1/4"	6' 3"	5-1/2"	5-1/2"
ATC-DC-1018M-35-1EF	326	222	30	103,600	20,450	13,060	28,300	180	59	7.5	1030	630	12"	22,790	16' 1-5/8"	5' 2-1/4"	6' 3"	5-1/2"	6-7/8"
ATC-DC-1018I-25-2EF	298	160	10	71,100	23,470	16,370	31,430	277	62	7.5	1030	630	12"	25,920	16' 9-7/8"	5' 2-1/4"	6' 11-1/4"	13-3/4"	5-1/2"
ATC-DC-1018J-35-2EF	303	167	10	70,400	24,610	17,500	32,580	290	75	7.5	1030	630	12"	27,060	16' 9-7/8"	5' 2-1/4"	6' 11-1/4"	13-3/4"	6-7/8"
ATC-DC-1018J-25-2EF	328	178	15	81,400	23,610	16,370	31,560	277	62	7.5	1030	630	12"	26,050	16' 9-7/8"	5' 2-1/4"	6' 11-1/4"	13-3/4"	5-1/2"
ATC-DC-1018J-35-2EF	334	188	15	80,600	24,740	17,500	32,710	290	75	7.5	1030	630	12"	27,200	16' 9-7/8"	5' 2-1/4"	6' 11-1/4"	13-3/4"	6-7/8"
ATC-DC-1018K-25-2EF	352	191	20	89,600	23,670	16,370	31,630	277	62	7.5	1030	630	12"	26,110	16' 9-7/8"	5' 2-1/4"	6' 11-1/4"	13-3/4"	5-1/2"
ATC-DC-1018K-35-2EF	359	204	20	88,700	24,800	17,500	32,770	290	75	7.5	1030	630	12"	27,260	16' 9-7/8"	5' 2-1/4"	6' 11-1/4"	13-3/4"	6-7/8"
ATC-DC-1018L-25-2EF	371	201	25	96,600	23,700	16,370	31,660	277	62	7.5	1030	630	12"	26,150	16' 9-7/8"	5' 2-1/4"	6' 11-1/4"	13-3/4"	5-1/2"
ATC-DC-1018L-35-2EF	378	217	25	95,600	24,840	17,500	32,810	290	75	7.5	1030	630	12"	27,290	16' 9-7/8"	5' 2-1/4"	6' 11-1/4"	13-3/4"	6-7/8"
ATC-DC-1018M-25-2EF	385	209	30	102,600	23,760	16,370	31,710	277	62	7.5	1030	630	12"	26,200	16' 9-7/8"	5' 2-1/4"	6' 11-1/4"	13-3/4"	5-1/2"
ATC-DC-1018M-35-2EF	392	227	30	101,600	24,890	17,500	32,860	290	75	7.5	1030	630	12"	27,350	16' 9-7/8"	5' 2-1/4"	6' 11-1/4"	13-3/4"	6-7/8"

* Tons at standard conditions: 96.3°F condensing, 20°F suction and 78°F W.B.

** Gallons shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation. (12" would normally be sufficient.)

*** Refrigerant charge is shown for R-717. Multiply by 1.93 for R-22 and 1.98 for R-134a.

† Heaviest section is the coil section.

Dimensions are subject to change. Do not use for pre-fabrication. Quantity of coil connections subject to change based on refrigerant and design conditions.

NOTE: Interconnecting piping between ARID fin Pak™ Dry Coil outlets and Ellipti-fin® Coil inlets are field installed and tested (by others).

IBC Compliance

IBC Compliance

EVAPCO has been applying advanced structural technology to evaporative condensers for many years. Following seismic events in the mid 1990's EVAPCO introduced the UB Series of induced draft cooling towers, fluid coolers and evaporative condensers. These products were designed, built and independently certified for extreme seismic and wind forces. EVAPCO's new line of ATC-DC Evaporative Condensers are IBC compliant as standard construction.

International Building Code

The International Building Code (IBC) is a comprehensive set of regulations addressing the structural design and installation requirements for building systems – including HVAC and industrial refrigeration equipment. As of June 2008, all 50 states plus Washington D.C have adopted the International Building Code. Compared to previous building codes that solely examined anchorage, the earthquake provisions contained within the International Building Code address anchorage, structural integrity, and operational capability of a component following a seismic event. The goal of the IBC is to minimize the loss of life and improve the capability of essential facilities to operate after a seismic event.

The International Building Code (IBC) was developed to replace the *BOCA National Building Code*, ICBO's *Uniform Building Code* and SBCCI's *Standard Building Code*. The International Building Code specifies that all components be designed to resist the equivalent seismic forces as the structure to which they are installed whereas previous building codes focused exclusively on the structure of the building to provide resistance against seismic forces. These components include all aspects of the building architectural, electrical and mechanical systems. The failure of these components during a seismic event has been a common occurrence in recent history. Although the structure of the building may be relatively undamaged from an earthquake, the damage to the nonstructural components could be significant and result in considerable secondary damage to the building (ie. flooding, fire, structural damage).

Seismic Design

The IBC specifies that all installed components must meet the requirements of ASCE 7-10 (American Society of Civil Engineers, *Minimum Design Loads for Buildings and Other Structures*). Exemptions noted in the code are for all mechanical components assigned to seismic design categories A or B. ASCE 7-10 explicitly states that in addition to the attachment and supports, the component itself must be designed to withstand the seismic

forces prescribed in the code. Simply stated, the code provisions

require that evaporative cooling equipment and all other components permanently installed on a structure must meet the same seismic design criteria as the building.

The seismic design force, utilized for component design, represents an equivalent static force that is applied to the components' center of gravity as described in the following equation:

$$F_p = [(0.4 * (a_p) * (S_{DS}) * (W_p)) / (R_p / I_p)] * (1 + 2 * (z / h))$$

F_p = Seismic Design Force centered at the component's center of gravity

S_{DS} = Design spectral response acceleration, short period

a_p = Component amplification factor

I_p = Component importance factor

W_p = Component operating weight

R_p = Component response modification factor

z = Height in structure of point of attachment of component with respect to the base

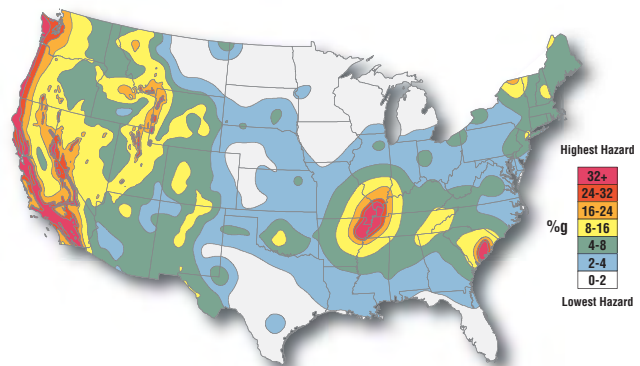
h = Average roof height of structure with respect to the base

The minimum and maximum design force limits are specified as:

$$F_{p-min} = 0.3 S_{DS} I_p W_p$$

$$F_{p-max} = 1.6 S_{DS} I_p W_p$$

A series of charts and graphs are used to determine the appropriate factors based on the location of the installation and ultimately the "importance" of the facility. A chart of the potential seismic activity in the United States is shown below.



Map courtesy US Geological Survey website

IBC Compliance

Importance Factor (I_p)

A major parameter that must be determined prior to calculating the seismic design force is the component importance factor (I_p). ASCE 7-10 defines the component importance factor as:

Importance Factor, I_p	Classification
1.5	<ul style="list-style-type: none"> Life safety component required to function after seismic event. Component containing hazardous content where the quantity, if released, exceeds a threshold limit that is sufficient to pose a threat to the public. Components installed at Risk Category IV (essential) facilities
1.0	All other components

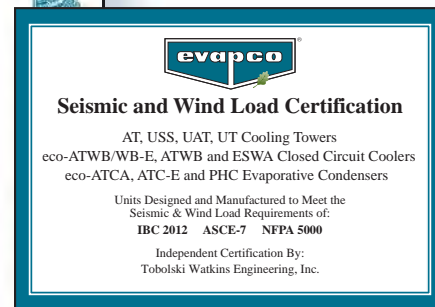
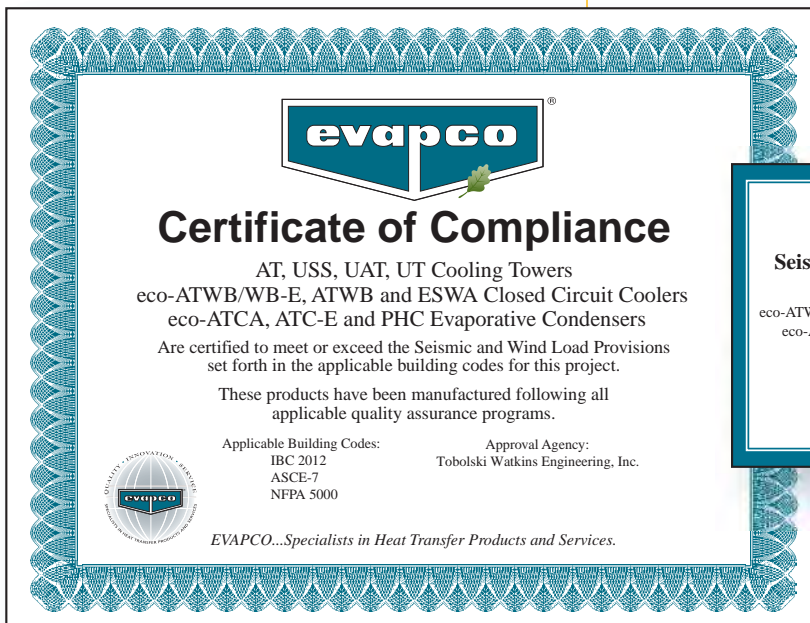
According to ASCE 7-10, Section 13.1.3, components containing hazardous contents that could release an amount in excess of code limits require an importance factor of 1.5. However, per ASCE 7-10, Section 1.5.3, the importance factor may be reduced to 1.0 should the authority having jurisdiction deem an acceptable Risk Management Program (RMP) would limit a release such that the release would not pose a threat to the public. The importance factor has significant impact on the design of the equipment necessary for the application. Please contact the factory for assistance in understanding your needs.

Design Implementation

In order to achieve this goal, an architect or civil engineer is responsible for analyzing the soil and the design of a structure to determine the factors to be used and provide those in construction documents. A mechanical consulting engineer and/or design build contractor applies these factors to advise the manufacturer on the proper design for the application. EVAPCO takes this information and determines the necessary condenser construction to meet IBC regulations. This process ensures that the mechanical equipment and its components are seismically compliant per the provisions of the International Building Code.

Independent Certification

As required by the International Building Code, EVAPCO supplies a certificate of compliance as part of its submittal documents. The certificate of compliance should demonstrate that the equipment/unit has been independently tested and analyzed in accordance with the IBC program. Evapco has worked closely with Tobolski Watkins Engineering, Inc., a Certified Seismic Qualification Agency, to complete the independent equipment testing and analysis. A sample of the certificate of compliance and unit label is presented below:

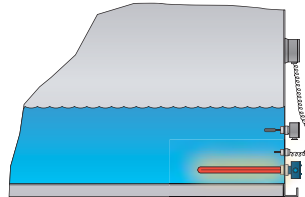




ATC-DC Optional Equipment

Electric Heaters

Electric immersion heaters are available factory installed in the basin of the condenser. They are sized to maintain a +40° F pan water temperature with the fans off and an ambient air temperature of 0°F, -20°F or -40°F. They are furnished with a thermostat to cycle the heater on when required and a low water protection device 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.



ATC-DC Heater Sizes (kW)			
8-1/2' Wide Models	0°F	-20°F	-40°F
ATC-DC-99H-25-1EF to 99J-35-2EF	7	10	15
ATC-DC-912I-25-1EF to 912K-35-2EF	(2) 4	(2) 7	(2) 9
ATC-DC-914J-25-1EF to 914K-35-2EF	(2) 5	(2) 7	(2) 10
ATC-DC-918H-25-1EF to 918J-35-2EF	(2) 6	(2) 9	(2) 12
ATC-DC-921H-25-1EF to 921J-35-2EF	(2) 7	(2) 12	(2) 15
17' Wide Models	0°F	-20°F	-40°F
ATC-DC-1712I-25-1EF to 1712K-35-2EF	(4) 4	(4) 7	(4) 9
ATC-DC-1714J-25-1EF to 1714K-35-2EF	(4) 5	(4) 7	(4) 10
10' Wide Models	0°F	-20°F	-40°F
ATC-DC-1012I-25-1EF to 1012L-35-2EF	(2) 5	(2) 8	(2) 10
ATC-DC-1018I-25-1EF to 1018M-35-2EF	(2) 7	(2) 12	(2) 15
ATC-DC-1024I-25-1EF to 1024L-35-2EF	(4) 5	(4) 8	(4) 10
ATC-DC-1036I-25-1EF to 1036M-35-2EF	(4) 7	(4) 12	(4) 15
12' Wide Models	0°F	-20°F	-40°F
ATC-DC-1212J-25-1EF to 1212L-35-2EF	(2) 6	(2) 9	(2) 12
ATC-DC-1214K-25-1EF to 1214M-35-2EF	(2) 7	(2) 10	(2) 15
ATC-DC-1218K-25-1EF to 1218M-35-2EF	(2) 9	(2) 15	(2) 18
ATC-DC-1220L-25-1EF to 1220N-35-2EF	(2) 10	(2) 15	(3) 15
ATC-DC-1224K-25-1EF to 1224L-35-2EF	(4) 6	(4) 9	(4) 12
ATC-DC-1228K-25-1EF to 1228M-35-2EF	(4) 7	(4) 10	(4) 15
ATC-DC-1236K-25-1EF to 1236M-35-2EF	(4) 9	(4) 15	(4) 18
ATC-DC-1240L-25-1EF to 1240N-35-2EF	(4) 10	(4) 15	(6) 15
24' Wide Models	0°F	-20°F	-40°F
ATC-DC-2412K-25-1EF to 2412L-35-2EF	(4) 6	(4) 9	(4) 12
ATC-DC-2414K-25-1EF to 2414M-35-2EF	(4) 7	(4) 10	(4) 15
ATC-DC-2418K-25-1EF to 2418M-35-2EF	(4) 9	(4) 15	(4) 18
ATC-DC-2420L-25-1EF to 2420N-35-2EF	(4) 10	(4) 15	(4) 20

Water Treatment Solutions

Pulse~Pure® Non-Chemical Treatment



U.S. Patent No. 7,704,364

Pulse~Pure® is an environmentally sensitive non-chemical water treatment system for evaporative condensers. Developed by EVAPCO, Pulse~Pure offers an alternative to chemical water treatment programs. Utilizing pulse-power technology Pulse~Pure provides chemical-free treatment that is environmentally safe.

Smart Shield® Solid Chemistry Water Treatment System

EVAPCO's SmartShield® solid chemistry water treatment system is an innovative solution to conventional liquid chemical programs. SmartShield® 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.



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 is located at each maintenance access door.



ATC-DC Condenser with Optional Service Platforms

Motor Davit

In the event that a fan motor should need to be replaced, a lightweight motor davit is available from which a chain fall can be mounted to easily lower the motor to the ground.

ATC-DC Mechanical Specifications

Furnish and install, as shown on the plans, an EVAPCO model _____ induced draft, counterflow evaporative condenser with a condensing capacity of _____ MBH total heat of rejection when operating with _____ refrigerant at _____ °F condensing temperature at a design _____ ambient dry bulb temperature of _____ °F.

IBC 2012 Compliance

The condenser shall be designed and constructed to meet the International Building Code (IBC) specifications for installed components per ASCE. The manufacturer shall provide a certificate of compliance to demonstrate that the equipment/unit has been independently tested and certified in accordance with the IBC.

Basin and Casing

The basin and casing shall be constructed of G-235 hot-dip galvanized steel for long life and durability. Standard basin accessories shall include overflow, drain, type 304 stainless steel strainers, and brass make-up valve with plastic float.

Models ATC-DC-99H-25-1EF to ATC-DC-1714K-35-2EF

Fan Motor

_____ horsepower totally enclosed fan cooled motors with 1.15 service factor shall be furnished suitable for outdoor service on _____ volts, _____ hertz, and _____ phase. Motor(s) shall be mounted on an adjustable base which is accessible from the outside of the unit for service. A swing away protective cover shall shield the motor and sheave from the weather.

Drive

The fan drive shall be multigroove, solid back V-belt type with taper lock bushings designed for 150% of the motor nameplate horsepower. The belt material shall be neoprene reinforced with polyester cord and specifically designed for evaporative condenser service. Fan sheave shall be aluminum alloy construction. The fans and the fan sheaves shall be mounted on the shaft with a specially coated bushing to provide maximum corrosion protection. Belt adjustment shall be accomplished from the exterior of the unit. Bearing lube lines shall be extended to the exterior of the unit for easy maintenance.

Models ATC-DC-1012I-25-1EF to ATC-DC-2420N-35-2EF

Fan Motor

_____ horsepower totally enclosed air over ball bearing fan motor(s), with 1.15 service factor shall be furnished suitable for service on _____ volts, _____ hertz, and _____ phase. Motor(s) shall be mounted on an adjustable base which allows the motor to swing to the outside of the unit for servicing.

Drive

The fan drive shall be a multigroove, solid back V-belt type with taper lock bushings designed for 150% of the motor nameplate horsepower. The belt material shall be neoprene reinforced with polyester cord and specifically designed for evaporative condenser service. Fan and motor sheaves shall be aluminum alloy construction. The fans and fan sheaves shall be mounted on the shaft with a specially coated bushing to provide maximum corrosion protection. Belt adjustment shall be accomplished from the exterior of the unit. Bearing lube lines shall be extended to the exterior of the unit for easy maintenance.

Axial Propeller Fans

Fans shall be heavy duty axial propeller type statically balanced. The fans shall be constructed of aluminum alloy or fiberglass reinforced polypropylene blades, installed in a closely fitted cowl with venturi air inlet. Fan screens shall be galvanized steel mesh and frame, bolted to the fan cowl.

Fan Shaft Bearings

Fan shaft bearings shall be heavy duty self-aligning ball type with grease fittings extended to the outside of the unit. Bearings shall be designed for a minimum L-10 life of 75,000 hours.

Water Recirculation Pump

The pump(s) shall be a close-coupled, centrifugal type with mechanical seal, installed vertically at the factory to allow free drainage on shut down. _____ horsepower totally enclosed motor(s) shall be furnished suitable for outdoor service on _____ volts, _____ hertz, and _____ phase.

Heat Transfer Coils

Dry Coil

Arid-fin Pak dry cooling coils shall be constructed of 5/8" diameter type 304L stainless steel round tubing with marine grade aluminum fins with a fin density of 10 fins per inch. Tubing shall be hydraulically expanded into the fin plate for consistent contact. Coil shall be pressure tested to 390 psig, evacuated and nitrogen charged prior to final assembly and shipment. Stainless steel tubing meets the requirements of ASME B31.5 of the refrigerant piping code.

Wet Coil

Ellipti-fin® condensing coils with standard elliptical tube design shall be all prime surface steel, encased in a steel framework and hot-dip galvanized after fabrication as a complete assembly. All coil rows shall be manufactured with elliptical extended surface fins designed with sloping tubes for liquid drainage and tested to 390 psig air under water, evacuated and nitrogen charged prior to final assembly and shipment. Carbon steel tubing meets the requirements of ASME B31.5 of the refrigerant piping code.

Water Distribution System

The system shall provide a water flow rate of 6 GPM over each square foot of unit face area to ensure proper flooding of the coil. The spray header shall be constructed of schedule 40 polyvinyl chloride pipe for corrosion resistance. All spray branches shall be removable for cleaning. Heavy-duty ABS spray nozzles with large 1-1/4" diameter opening and internal sludge ring to eliminate clogging. Nozzles shall be threaded into spray header to provide easy removal for maintenance.

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.

Louvers

The louvers shall be constructed from polyvinyl chloride (PVC) and mounted in a rugged steel frame. The louvers shall be mounted in easily removable sections for access to the pan for maintenance. The louvers shall have a minimum of two changes in air direction to prevent splashout and block direct sunlight.

Finish

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



EVAPCO PRODUCTS ARE MANUFACTURED WORLDWIDE.



- World Headquarters/ Research and Development Center
- EVAPCO Facilities

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EVAPCO...SPECIALISTS IN HEAT TRANSFER PRODUCTS AND SERVICES.



NEW!

eco-ATC-A

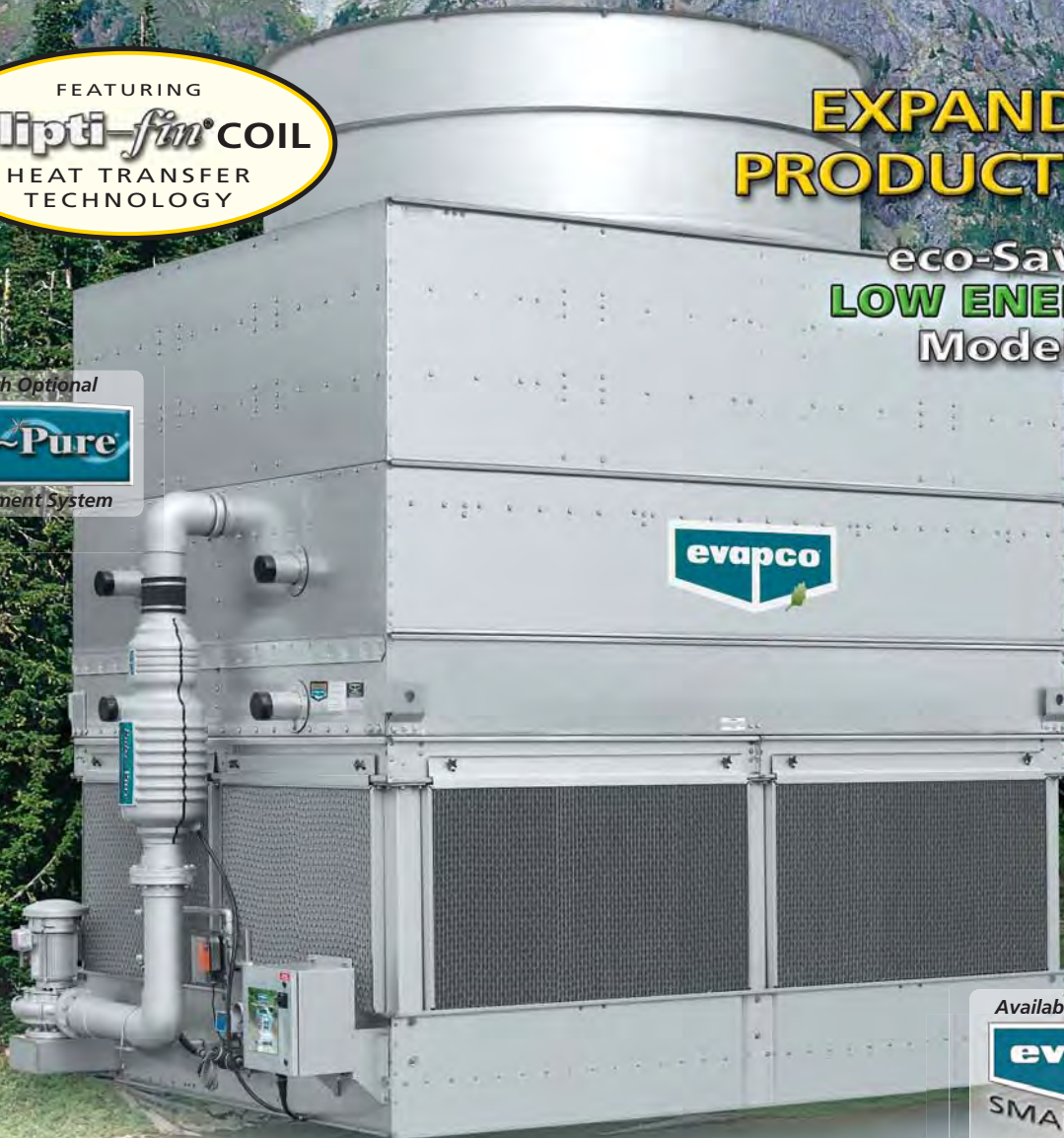
EVAPORATIVE CONDENSERS

FEATURING
Ellipti-fin COIL
HEAT TRANSFER
TECHNOLOGY

**EXPANDED
PRODUCT LINE!**

eco-Saver
LOW ENERGY
Models

Shown with Optional
Pulse~Pure
Water Treatment System



Available with Optional
evapco
SMART SHIELD
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ENVIRONMENTALLY CONSCIOUS OPERATION

Available in Capacities from 87 to 2,728 Ammonia Tons!



IARW International Association of Refrigerated Warehouses

Member of
iiar
International Institute of Ammonia Refrigeration
www.iiar.org

AHRP Air-Conditioning, Heating, and Refrigeration Institute



eco-ATC-A Design and Construction Features

The eco-ATC-A line of evaporative condensers represents EVAPCO's newest advancement in thermal heat transfer research and development. Utilizing the **Ellipti-fin**® heat transfer coil, the eco-ATC-A offers improved heat transfer during wet operation and offers significant water savings due to extended periods of dry operation. The eco-ATC-A is another chapter in EVAPCO's on-going commitment to quality, environmentally friendly products.

Ellipti-fin® Heat Transfer Technology

- Thermal Pak® coil with extended surface.
 - Water savings through extended periods of dry operation.
 - High heat transfer efficiency.
 - Low refrigerant charge.
- Patent Pending

G-235 Mill Hot-Dip Galvanized Steel Construction

(Stainless steel available as affordable option)



PVC Spray Distribution Header with ZM® II Nozzles

- Large orifice nozzles prevent clogging (no moving parts).
- Redesigned nozzles for superior water distribution.
- Nozzles are threaded into header at proper orientation.
- Fixed position nozzles require zero maintenance.
- Threaded end caps for ease of cleaning.
- Guaranteed for life.



Water Saver Drift Eliminators

- Patented design reduces drift rate to 0.001%.
 - Made from corrosion resistant PVC for long life.
- U.S. Patent No. 6,315,804



Non-Chemical Water Treatment (optional)

- Scale, corrosion and bacteria control.
 - Factory mounted with single source responsibility.
 - Environmentally safe, chemical-free water treatment.
- U.S. Patent No. 7,704,364

Totally Enclosed Pump Motors

- Help assure long, trouble-free operation.



Solid Chemistry Water Treatment (Optional)

- Controlled release chemistry provides uniform treatment over a 30 day period.
 - Factory mounted and wired.
 - Easier and safer, eliminates the potential for liquid spills.
- U.S. Patent No. 8,398,850



Stainless Steel Strainer

- Resists corrosion better than other materials.



Super Low Sound Fan (optional)

- 9-15 dB(A) sound reduction.
- Extremely wide chord fan blades for sound sensitive applications.
- One piece molded heavy duty construction.

Advanced Drive System Design

- Totally Enclosed Fan Motors assures Long Life.
- Power-Band Belts for Better Lateral Rigidity.
- Advanced Design Aluminum Fan Blades.
- Non-corroding Cast Aluminum Sheaves.
- Heavy-Duty Fan Shaft Bearings with L-10 Life of 75,000 - 135,000 hrs.
- All Other Components Corrosion Resistant Materials.
- All Components Covered by 5 Year Warranty.



Easy to Service Motor Mount Design

- All normal maintenance can be performed quickly from outside the unit.
- Designed for easy belt adjustment.
- Extended lube lines for easy bearing lubrication.
- If required, motor may swing to outside for easy removal (10', 12' & 24' wide models).



Unique Field Seam

- Eliminates up to 66% of fasteners.
- Self guiding channels improve quality of field seam to reduce leaks.
- Easy to install.
- Lower installation cost.

Air Inlet Access Door (Optional)

- Increased ease of access to basin.
- Hinged access panel with quick release mechanism.
- Not available on all models.



WST Framed Inlet Louvers (Water and Sight Tight)

- Framed for easy handling, tighter fit and longer life
- Design keeps sunlight out – preventing biological growth.
- Keeps water in while keeping dirt and debris out.



“Clean Pan” Basin Design

- Access from all four sides.
- Large open area simplifies maintenance.
- Basin may be inspected with pumps running.
- Sloped basin design prevents sediment buildup, biological film and standing water.



Since its founding in 1976, EVAPCO, Incorporated has become an industry leader in the engineering and manufacturing of quality heat transfer products around the world. EVAPCO's mission is to provide first class service and quality products for the following markets:

- Industrial Refrigeration
- Commercial HVAC
- Industrial Process
- Power

EVAPCO's powerful combination of financial strength and technical expertise has established the company as a recognized manufacturer of market-leading products on a worldwide basis. EVAPCO is also recognized for the superior technology of their environmentally friendly product innovations in sound reduction and water management.

EVAPCO is an employee owned company with a strong emphasis on research & development and modern manufacturing plants. EVAPCO has earned a reputation for technological innovation and superior product quality by featuring products that are designed to offer these operating advantages:

- Higher System Efficiency
- Environmentally Friendly
- Lower Annual Operating Costs
- Reliable, Simple Operation and Maintenance

With an ongoing commitment to Research & Development programs, EVAPCO provides the most advanced products in the industry – **Technology for the Future, Available Today!**

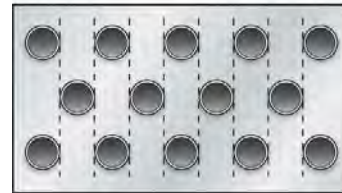


EVAPCO products are manufactured in 17 locations in 9 countries around the world and supplied through a sales network consisting of over 180 offices.

Ellipti-fin® Heat Transfer Coil

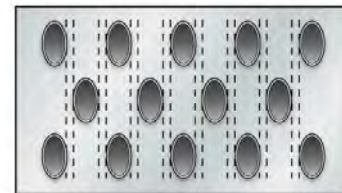
Evolution of Heat Transfer Technology

EVAPCO has a long standing commitment to heat transfer research and development. This commitment has resulted in a number of advancements in heat transfer coil design. Up until the mid-1980's, evaporative condensers were manufactured



Round Tube Coil by Others

with tightly packed round tube coils. Through thousands of hours of testing and research, EVAPCO developed the Thermal Pak® coil. The Thermal Pak® coil was patented in 1987, (now expired), and changed the thinking of system design engineers by changing the shape of the coil tubes. The elliptical tube design maximized the effective tube surface area while lowering airside pressure drop and allowing for higher water loading. The combination of the elliptical shape tube in the Thermal Pak® orientation increased heat transfer efficiency and resulted in one of the highest capacities per plan area of evaporative condensers available today.

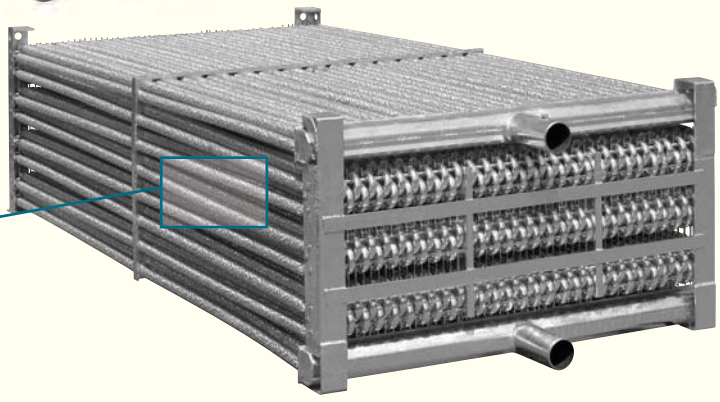
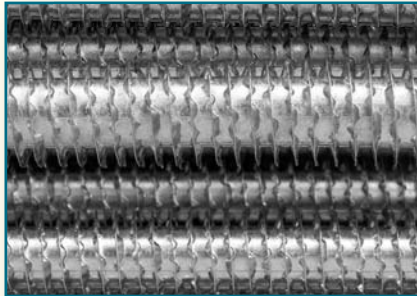


Thermal-Pak® Coil by EVAPCO

Throughout the late 1980's and into the 1990's EVAPCO was continuously looking for ways to improve heat transfer efficiency. This research resulted in the development of the Thermal Pak® II heat transfer coil. The Thermal Pak® II coil utilized the same elliptical shape tube introduced in the original Thermal Pak coil, but changed the orientation of the tubes to improve the tubes air to water interface for increased heat transfer efficiency.

The development of the Thermal Pak® II coil resulted in a reduction in refrigerant charge as well as a reduction in operating weight through reduced coil volume while maintaining the same thermal performance as the original Thermal Pak® coil design.

NEW
Ellipti-fin® Heat Transfer Coil



- Elliptical Tubes with Spiral Wound Fins
- Improved Dry and Wet Operation
- All Rows Finned



Thermal-Pak® II Coil by EVAPCO

Research and development is an on-going process at EVAPCO. Through the success of the Thermal Pak II coil, EVAPCO saw the potential for new coil configurations and the need for new manufacturing technology to improve processes and efficiency. During this same time, it became evident that a need exists for more environmentally conscious evaporative cooling products.

EVAPCO used the experience gained through the development of the Thermal Pak and Thermal Pak II heat transfer coils and combined with new manufacturing procedures to develop the **Ellipti-fin®** heat transfer coil. The **Ellipti-fin®** coil utilizes elliptical shape tube with extended surface fins for maximum heat transfer efficiency. **The extended surface increases the heat transfer efficiency in the evaporative or wet mode as well as the dry mode of operation.**



Ellipti-fin® Finned Elliptical Tube by EVAPCO (Patent Pending)

The **Ellipti-fin®** coil incorporates features of both the Thermal Pak and Thermal Pak II coils as the tubes are oriented vertically yet spaced so as not to increase the airside pressure drop. As such, eco-ATC-A condensers are not subject to the performance penalties normally associated with round tube extended surface coils. Additionally, EVAPCO ensures proper evaporative operation by thoroughly wetting the coil surface with one of the highest water loading rates in the industry for conventional evaporative condensers.

Ellipti-fin® coils are manufactured from high quality carbon steel tubing following the most stringent quality control procedures and in accordance with the ASME B31.5 Refrigerant Piping Code. Each circuit is inspected to assure the material quality and tested before fins are wound onto the surface of the tube. Each circuit is then assembled into a complete coil. Finally, the assembled coil is tested at 390 P.S.I.G. air pressure under water to make sure it is leak free. To protect the coil against corrosion, and complete the bond between tube and fin, the entire assembly is dipped in molten zinc (hot dip galvanized) at a temperature of approximately 800°F.

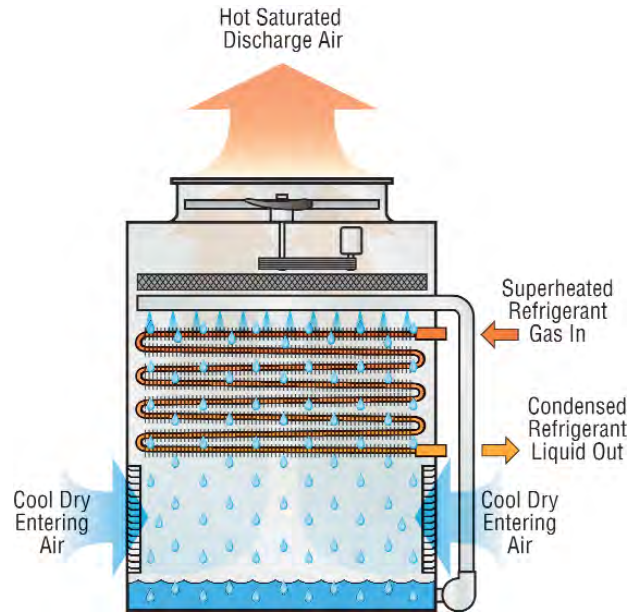
EVAPCO'S new **Ellipti-fin®** condensing coils are designed for maximum heat transfer efficiency. This unique coil design utilizes counterflow heat transfer. The rows of the finned elliptical tubes are positioned vertically in the direction of airflow to enhance turbulence, which increases heat transfer while minimizing airside pressure drop. The design features of EVAPCO'S **Ellipti-fin®** condensing coils ensure the end-user will receive maximized evaporative heat transfer efficiency wet or dry. These characteristics and other engineering advancements of the **Ellipti-fin®** have been proven in EVAPCO'S world-class research and development laboratory.

eco-ATC-A Design Features *Proven Performance and Design Flexibility*

Principle of Operation

Evaporative Mode

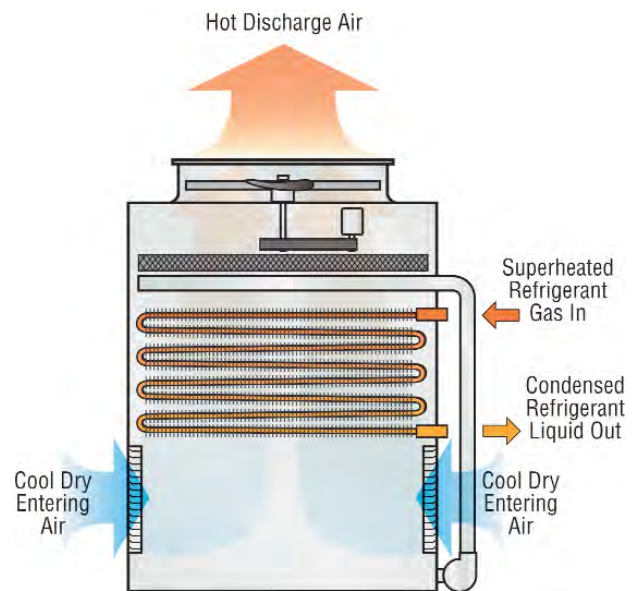
The refrigerant gas is discharged from the compressor into the inlet connection of the eco-ATC-A condenser. Water from the condenser's sump is circulated over the condenser coil, while ambient air is simultaneously drawn into the unit. As the ambient air moves up through the coil section, a portion of 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 to the high pressure liquid receiver for return to the system. The hot, saturated air is drawn 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.



eco-ATC-A Evaporative Mode

Dry Mode

The refrigerant gas is discharged from the compressor into the inlet connection of the eco-ATC-A condenser. Ambient air is drawn into the unit and moves over the heat transfer coil. The air is warmed while the tubes containing the refrigerant gas are cooled. 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 to the high pressure liquid receiver for return to the system. The hot discharge air is drawn through the drift eliminators and then the fan then discharges the air stream out of the top of the unit where it can dissipate harmlessly into the atmosphere.



eco-ATC-A Dry Mode

eco-ATC-A Design Features *Proven Performance and Design Flexibility*

Water and Energy Saving with eco-ATC-A Technology

Low Fan Motor Hp

The eco-ATC-A features the new EVAPCO **Ellipti-fin**[®] coil, which utilizes elliptical spiral fin coil technology. This technology allows a 10% to 30% increase in thermal performance, depending on the coil configuration, when operating in the wet or evaporative mode, while offering model selections with reduced fan motor horsepower. This will result in significant energy savings throughout the year.

Reduced Plan Area

Due to the increased thermal performance, new eco-ATC-A also minimizes the footprint required for a given capacity thereby reducing the space required for an evaporative condenser. A smaller footprint means less steel and lower installation costs.

Significant Water Savings

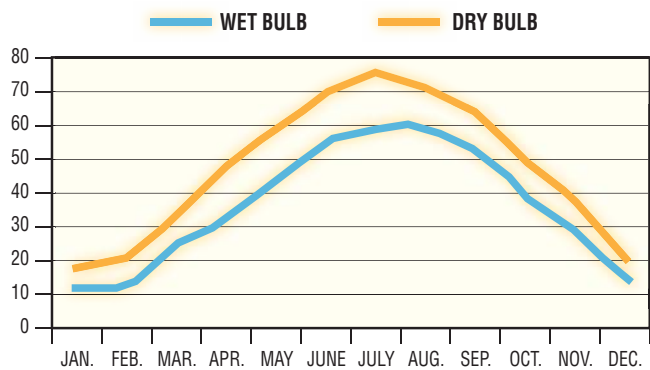
The **Ellipti-fin**[®] coil technology enables the eco-ATC-A to be operated in a 100% Dry Mode at a significantly higher switchover temperature than that of a typical bare tube coil evaporative condenser. This leads to a significant increase in the number of hours per year the condenser can operate in dry mode (spray pumps off), thus increasing your water savings. This combination of features allows the eco-ATC-A to be operated with both energy and water efficiency in mind, making it the ideal choice for many installations.

Consider a meat processing plant application near Minneapolis, MN where the unit is required to reject a constant heat load of 500 tons of refrigeration at a 95°F condensing temperature and a summer design wet bulb temperature of 76°F. The process operates 24 hours a day 7 days a week. The eco-ATC-A evaporative condenser and an ATC-E evaporative condenser are compared as follows:

EVAPCO Model	ATC-723E	eco-ATC-700A
Plan Area	12' x 18'	12' x 18'
Fan Motor	30 hp	20 hp
Pump Motor	7-1/2 hp	7-1/2 hp

Model Comparison

In the previous example, the eco-ATC-A model requires lower fan motor horsepower than the equivalent ATC-E while maintaining the same plan area. The potential for reduced hp during wet operation is only one of the eco-ATC-A benefits. The enhanced dry performance of the eco-ATC-A can be illustrated by using bin weather data for Minneapolis, MN as shown below.



Minneapolis Annual Weather Data

Assuming a load profile requiring full 70% heat rejection requirement for a full time operation of the refrigeration system yields the following comparison between the eco-ATC-A and the ATC:

EVAPCO Model	ATC-723-1g	eco-ATC-700A-1g
Plan Area	12' x 18'	12' x 18'
Fan Motor	30 hp	20 hp
Pump Motor	7-1/2 hp	7-1/2 hp
70% Dry Switchover (°F)	-5°F	35.7°F
% Dry Operation/Year	2%	34%

The above example shows the eco-ATC-700A-1g can be operated without spray water 34% of the year while maintaining 70% of the full load capacity. The additional dry operation means less opportunity for freeze-ups, reduced water management costs and reduced water treatment costs.

IBC Compliance

IBC Compliance

EVAPCO has been applying advanced structural technology to evaporative condensers for many years. Following seismic events in the mid 1990's EVAPCO introduced the UB Series of induced draft cooling towers, fluid coolers and evaporative condensers. These products were designed, built and independently certified for extreme seismic and wind forces. With the advent of the International Building Code, EVAPCO is now offering a new line of eco-ATC-A Evaporative Condensers that is IBC compliant as standard construction.

International Building Code

The International Building Code (IBC) is a comprehensive set of regulations addressing the structural design and installation requirements for building systems – including HVAC and industrial refrigeration equipment. As of June 2008, all 50 states plus Washington D.C have adopted the International Building Code. Compared to previous building codes that solely examined anchorage, the earthquake provisions contained within the International Building Code address anchorage, structural integrity, and operational capability of a component following a seismic event. The goal of the IBC is to minimize the loss of life and improve the capability of essential facilities to operate after a seismic event.

The International Building Code (IBC) was developed to replace the *BOCA National Building Code*, *ICBO's Uniform Building Code* and *SBCCI's Standard Building Code*. The International Building Code specifies that all components be designed to resist the equivalent seismic forces as the structure to which they are installed whereas previous building codes focused exclusively on the structure of the building to provide resistance against seismic forces. These components include all aspects of the building architectural, electrical and mechanical systems. The failure of these components during a seismic event has been a common occurrence in recent history. Although the structure of the building may be relatively undamaged from an earthquake, the damage to the nonstructural components could be significant and result in considerable secondary damage to the building (ie. flooding, fire, structural damage).

Seismic Design

The IBC specifies that all installed components must meet the requirements of ASCE 7-10 (American Society of Civil Engineers, *Minimum Design Loads for Buildings and Other Structures*). Exemptions noted in the code are for all mechanical components assigned to seismic design categories A or B. ASCE 7-10 explicitly states that in addition to the attachment and supports, the component itself must be designed to withstand the seismic

forces prescribed in the code. Simply stated, the code provisions require that evaporative cooling equipment and all other components permanently installed on a structure must meet the same seismic design criteria as the building.

The seismic design force, utilized for component design, represents an equivalent static force that is applied to the components' center of gravity as described in the following equation:

$$F_p = [(0.4 * (a_p) * (S_{DS}) * (W_p)) / (R_p / I_p)] * (1 + 2 * (z / h))$$

F_p = Seismic Design Force centered at the component's center of gravity

S_{DS} = Design spectral response acceleration, short period

a_p = Component amplification factor

I_p = Component importance factor

W_p = Component operating weight

R_p = Component response modification factor

z = Height in structure of point of attachment of component with respect to the base

h = Average roof height of structure with respect to the base

The minimum and maximum design force limits are specified as:

$$F_{p-min} = 0.3 S_{DS} I_p W_p$$

$$F_{p-max} = 1.6 S_{DS} I_p W_p$$

A series of charts and graphs are used to determine the appropriate factors based on the location of the installation and ultimately the "importance" of the facility. A chart of the potential seismic activity in the United States is shown below.



Map courtesy US Geological Survey website

IBC Compliance

Importance Factor (I_p)

A major parameter that must be determined prior to calculating the seismic design force is the component importance factor (I_p). ASCE 7-10 defines the component importance factor as:

Importance Factor, I_p	Classification
1.5	<ul style="list-style-type: none"> Life safety component required to function after seismic event. Component containing hazardous content where the quantity, if released, exceeds a threshold limit that is sufficient to pose a threat to the public. Components installed at Risk Category IV (essential) facilities
1.0	All other components

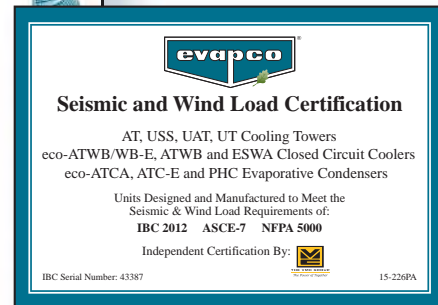
According to ASCE 7-10, Section 13.1.3, components containing hazardous contents that could release an amount in excess of code limits require an importance factor of 1.5. However, per ASCE 7-10, Section 1.5.3, the importance factor may be reduced to 1.0 should the authority having jurisdiction deem an acceptable Risk Management Program (RMP) would limit a release such that the release would not pose a threat to the public. The importance factor has significant impact on the design of the equipment necessary for the application. Please contact the factory for assistance in understanding your needs.

Design Implementation

In order to achieve this goal, an architect or civil engineer is responsible for analyzing the soil and the design of a structure to determine the factors to be used and provide those in construction documents. A mechanical consulting engineer and/or design build contractor applies these factors to advise the manufacturer on the proper design for the application. EVAPCO takes this information and determines the necessary condenser to meet IBC regulations. The standard eco-ATC-A design is independently certified to meet a seismic design force, F_p , of 1g. For applications that require a more severe seismic duty, EVAPCO offers an optional 5.12g construction design. This process ensures that the mechanical equipment and its components are seismically compliant per the provisions of the International Building Code.

Independent Certification

As required by the International Building Code, EVAPCO supplies a certificate of compliance as part of its submittal documents. The certificate of compliance should demonstrate that the equipment/unit has been independently tested and analyzed in accordance with the IBC program. Evapco has worked closely with Tobolski Watkins Engineering, Inc., a Certified Seismic Qualification Agency, to complete the independent equipment testing and analysis. A sample of the certificate of compliance and unit label is presented below:



Engineering Dimensions & Data

eco-ATC-325A-1g to eco-ATC-632A-1g

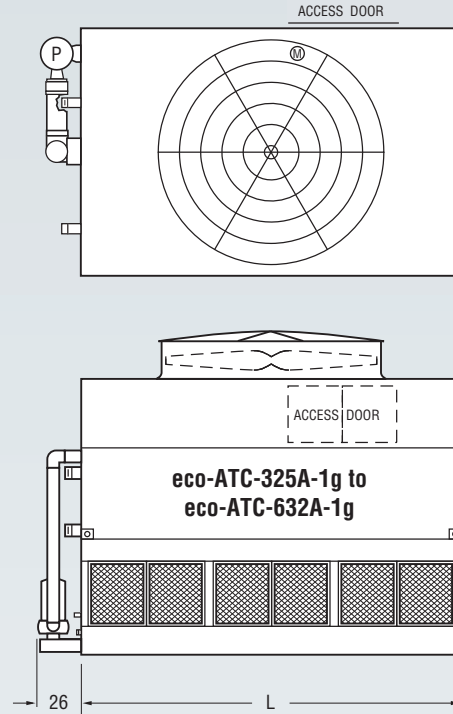
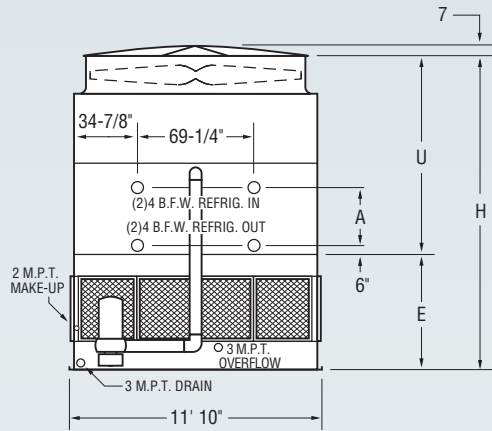


Table 16 Engineering Data

Model No.	R-717 Tons*	Fans		Weights†			Refrigerant Operating Charge lbs.***	Coil Volume ft ³	Spray Pump		Remote Pump			Dimensions				
		HP	CFM	Shipping	Operating	Heaviest Section†			HP	GPM	Gallons Req'd**	Conn. Size	Operating Weight	Height H	Upper U	Lower E	Coil A	Length L
eco-ATC-325A-1g	231	10	67,700	13,760	20,190	11,050	210	29	5	800	490	12"	16,240	12' 9-3/8"	7' 7-1/8"	5' 2-1/4"	13-3/4"	11' 11-3/4"
eco-ATC-355A-1g	252	15	77,500	13,890	20,320	11,180	210	29	5	800	490	12"	16,370	12' 9-3/8"	7' 7-1/8"	5' 2-1/4"	13-3/4"	11' 11-3/4"
eco-ATC-378A-1g	269	20	85,300	13,950	20,380	11,240	210	29	5	800	490	12"	16,430	12' 9-3/8"	7' 7-1/8"	5' 2-1/4"	13-3/4"	11' 11-3/4"
eco-ATC-393A-1g	279	25	91,800	13,980	20,410	11,270	210	29	5	800	490	12"	16,460	12' 9-3/8"	7' 7-1/8"	5' 2-1/4"	13-3/4"	11' 11-3/4"
eco-ATC-399A-1g	283	10	66,400	16,820	23,430	14,110	306	42	5	800	490	12"	19,480	13' 5-7/8"	8' 3-5/8"	5' 2-1/4"	22-1/4"	11' 11-3/4"
eco-ATC-435A-1g	309	15	76,000	16,950	23,560	14,240	306	42	5	800	490	12"	19,610	13' 5-7/8"	8' 3-5/8"	5' 2-1/4"	22-1/4"	11' 11-3/4"
eco-ATC-448A-1g	318	10	64,500	20,010	26,810	17,300	401	55	5	800	490	12"	22,860	14' 2-3/8"	9' 1/8"	5' 2-1/4"	30-3/4"	11' 11-3/4"
eco-ATC-463A-1g	329	20	83,700	17,010	23,620	14,300	306	42	5	800	490	12"	19,670	13' 5-7/8"	8' 3-5/8"	5' 2-1/4"	22-1/4"	11' 11-3/4"
eco-ATC-475A-1g	337	10	62,600	23,040	30,020	20,330	497	68	5	800	490	12"	26,070	14' 10-7/8"	9' 8-5/8"	5' 2-1/4"	39-1/4"	11' 11-3/4"
eco-ATC-481A-1g	342	25	89,200	17,040	23,650	14,330	306	42	5	800	490	12"	19,700	13' 5-7/8"	8' 3-5/8"	5' 2-1/4"	22-1/4"	11' 11-3/4"
eco-ATC-490A-1g	348	15	73,800	20,140	26,940	17,430	401	55	5	800	490	12"	22,990	14' 2-3/8"	9' 1/8"	5' 2-1/4"	30-3/4"	11' 11-3/4"
eco-ATC-522A-1g	371	20	81,200	20,200	27,000	17,490	401	55	5	800	490	12"	23,050	14' 2-3/8"	9' 1/8"	5' 2-1/4"	30-3/4"	11' 11-3/4"
eco-ATC-531A-1g	377	15	69,500	26,380	33,540	23,670	593	81	5	800	490	12"	29,590	15' 7-3/8"	10' 5-1/8"	5' 2-1/4"	47-3/4"	11' 11-3/4"
eco-ATC-543A-1g	386	25	86,600	20,230	27,030	17,520	401	55	5	800	490	12"	23,080	14' 2-3/8"	9' 1/8"	5' 2-1/4"	30-3/4"	11' 11-3/4"
eco-ATC-558A-1g	396	30	91,100	20,280	27,080	17,570	401	55	5	800	490	12"	23,130	14' 2-3/8"	9' 1/8"	5' 2-1/4"	30-3/4"	11' 11-3/4"
eco-ATC-565A-1g	401	20	76,400	26,440	33,600	23,730	593	81	5	800	490	12"	29,650	15' 7-3/8"	10' 5-1/8"	5' 2-1/4"	47-3/4"	11' 11-3/4"
eco-ATC-573A-1g	407	25	84,000	23,260	30,240	20,550	497	68	5	800	490	12"	26,290	14' 10-7/8"	9' 8-5/8"	5' 2-1/4"	39-1/4"	11' 11-3/4"
eco-ATC-588A-1g	418	25	81,400	26,470	33,630	23,760	593	81	5	800	490	12"	29,680	15' 7-3/8"	10' 5-1/8"	5' 2-1/4"	47-3/4"	11' 11-3/4"
eco-ATC-593A-1g	421	30	88,500	23,310	30,290	20,600	497	68	5	800	490	12"	26,340	14' 10-7/8"	9' 8-5/8"	5' 2-1/4"	39-1/4"	11' 11-3/4"
eco-ATC-605A-1g	430	30	85,700	26,520	33,680	23,810	593	81	5	800	490	12"	29,730	15' 7-3/8"	10' 5-1/8"	5' 2-1/4"	47-3/4"	11' 11-3/4"
eco-ATC-632A-1g	449	40	92,900	26,680	33,840	23,970	593	81	5	800	490	12"	29,890	15' 7-3/8"	10' 5-1/8"	5' 2-1/4"	47-3/4"	11' 11-3/4"

* Tons at standard conditions: 96.3°F condensing, 20°F suction and 78°F W.B.

** Gallons shown is water in suspension in unit and piping. Allow for additional water in bottom of remote sump to cover pump suction and strainer during operation. (12" would normally be sufficient.)

† Heaviest section is the coil section. **Weights shown are for 1g seismic design.**

*** Refrigerant charge is shown for R-717. Multiply by 1.93 for R-22 and 1.98 for R-134a.

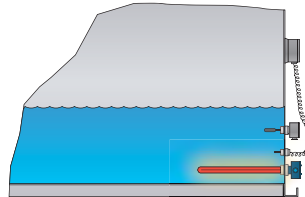
Dimensions are subject to change. Do not use for pre-fabrication. Quantity of coil connections subject to change based on refrigerant and design conditions.



eco-ATC-A Optional Equipment

Electric Heaters

Electric immersion heaters are available factory installed in the basin of the condenser. They are sized to maintain a +40° F pan water temperature with the fans off and an ambient air temperature of 0°F, -20°F or -40°F. They are furnished with a thermostat to cycle the heater on when required and a low water protection device 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.



eco-ATC-A Heater Sizes (kW)			
Models	0°F	-20°F	-40°F
eco-ATC-122A-1g to 263A-1g	6	8	12
eco-ATC-160A-1g to 326A-1g	7	10	15
eco-ATC-205A-1g to 394A-1g	8	12	15
eco-ATC-225A-1g to 434A-1g	(2) 4	(2) 7	(2) 9
eco-ATC-269A-1g to 504A-1g	(2) 5	(2) 7	(2) 10
eco-ATC-395A-1g to 671A-1g	(2) 6	(2) 9	(2) 12
eco-ATC-451A-1g to 804A-1g	(2) 7	(2) 12	(2) 15
eco-ATC-444A-1g to 862A-1g	(4) 4	(4) 7	(4) 9
eco-ATC-590A-1g to 1013A-1g	(4) 5	(4) 7	(4) 10
eco-ATC-441A-1g to 857A-1g	(4) 4	(4) 7	(4) 9
eco-ATC-528A-1g to 988A-1g	(4) 5	(4) 7	(4) 10
eco-ATC-300A-1g to 501A-1g	(2) 5	(2) 8	(2) 10
eco-ATC-391A-1g to 694A-1g	(2) 7	(2) 12	(2) 15
eco-ATC-642A-1g to 1002A-1g	(4) 5	(4) 8	(4) 10
eco-ATC-879A-1g to 1388A-1g	(4) 7	(4) 12	(4) 15
eco-ATC-325A-1g to 632A-1g	(2) 6	(2) 9	(2) 12
eco-ATC-408A-1g to 685A-1g	(2) 7	(2) 10	(2) 15
eco-ATC-432A-1g to 923A-1g	(2) 9	(2) 15	(2) 18
eco-ATC-585A-1g to 1001A-1g	(2) 10	(2) 15	(3) 15
eco-ATC-650A-1g to 1263A-1g	(4) 6	(4) 9	(4) 12
eco-ATC-770A-1g to 1369A-1g	(4) 7	(4) 10	(4) 15
eco-ATC-1020A-1g to 1847A-1g	(4) 9	(4) 15	(4) 18
eco-ATC-1120A-1g to 1993A-1g	(4) 10	(4) 15	(6) 15
eco-ATC-710A-1g to 1264A-1g	(4) 6	(4) 9	(4) 12
eco-ATC-816A-1g to 1370A-1g	(4) 7	(4) 10	(4) 15
eco-ATC-1021A-1g to 1848A-1g	(4) 9	(4) 15	(4) 18
eco-ATC-1159A-1g to 1983A-1g	(4) 10	(4) 15	(4) 20
eco-ATC-1293A-1g to 2515A-1g	(4) 12	(4) 18	(6) 15
eco-ATC-1493A-1g to 2659A-1g	(4) 15	(4) 20	(6) 18
eco-ATC-2182A-1g to 3583A-1g	(4) 18	(6) 18	(8) 18
eco-ATC-2247A-1g to 3846A-1g	(4) 20	(6) 20	(8) 20

Water Treatment Solutions

Pulse~Pure® Non-Chemical Treatment



U.S. Patent No. 7,704,364

Pulse~Pure® is an environmentally sensitive non-chemical water treatment system for evaporative condensers. Developed by EVAPCO, Pulse~Pure offers an alternative to chemical water treatment programs. Utilizing pulse-power technology Pulse~Pure provides chemical-free treatment that is environmentally safe.

Smart Shield® Solid Chemistry Water Treatment System

EVAPCO's SmartShield® solid chemistry water treatment system is an innovative solution to conventional liquid chemical programs. SmartShield® 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.



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 is located at each maintenance access door.



eco-ATC-A Condenser with Optional Service Platform and Motor Davit

Motor Davit

In the event that a fan motor should need to be replaced, a lightweight motor davit is available from which a chain fall can be mounted to easily lower the motor to the ground.

eco-ATC-A Mechanical Specifications

Furnish and install, as shown on the plans, an EVAPCO model _____ induced draft, counterflow evaporative condenser with a condensing capacity of _____ MBH total heat of rejection when operating with _____ refrigerant at _____ °F condensing temperature with a _____ °F design wet bulb temperature and a dry bulb switchover temperature of _____ °F.

IBC 2012 Compliance

The condenser shall be designed and constructed to meet the International Building Code (IBC) specifications for installed components per ASCE. The manufacturer shall provide a certificate of compliance to demonstrate that the equipment/unit has been independently tested and certified in accordance with the IBC.

Basin and Casing

The basin and casing shall be constructed of G-235 hot-dip galvanized steel for long life and durability.

Standard basin accessories shall include overflow, drain, type 304 stainless steel strainers, and brass make-up valve with plastic float.

Models eco-ATC-122A-1g to eco-ATC-988A-1g

Fan Motor

_____ horsepower totally enclosed fan cooled motors with 1.15 service factor shall be furnished suitable for outdoor service on _____ volts, _____ hertz, and _____ phase. Motor(s) shall be mounted on an adjustable base which is accessible from the outside of the unit for service. A swing away protective cover shall shield the motor and sheave from the weather.

Drive

The fan drive shall be multigroove, solid back V-belt type with taper lock bushings designed for 150% of the motor nameplate horsepower. The belt material shall be neoprene reinforced with polyester cord and specifically designed for evaporative condenser service. Fan sheave shall be aluminum alloy construction. The fans and the fan sheaves shall be mounted on the shaft with a specially coated bushing to provide maximum corrosion protection. Belt adjustment shall be accomplished from the exterior of the unit. Bearing lube lines shall be extended to the exterior of the unit for easy maintenance.

Models eco-ATC-300A-1g to eco-ATC-3846A-1g

Fan Motor

_____ horsepower totally enclosed air over ball bearing fan motor(s), with 1.15 service factor shall be furnished suitable for service on _____ volts, _____ hertz, and _____ phase. Motor(s) shall be mounted on an adjustable base which allows the motor to swing to the outside of the unit for servicing.

Drive

The fan drive shall be a multigroove, solid back V-belt type with taper lock bushings designed for 150% of the motor nameplate horsepower. The belt material shall be neoprene reinforced with polyester cord and specifically designed for evaporative condenser service. Fan and motor sheaves shall be aluminum alloy construction. The fans and fan sheaves shall be mounted on the shaft with a specially coated bushing to provide maximum corrosion protection. Belt adjustment shall be accomplished from the exterior of the unit. Bearing lube lines shall be extended to the exterior of the unit for easy maintenance.

Axial Propeller Fans

Fans shall be heavy duty axial propeller type statically balanced. The fans shall be constructed of aluminum alloy or fiberglass reinforced polypropylene blades, installed in a closely fitted cowl with venturi air inlet. Fan screens shall be galvanized steel mesh and frame, bolted to the fan cowl.

Fan Shaft Bearings

Fan shaft bearings shall be heavy duty self-aligning ball type with grease fittings extended to the outside of the unit. Bearings shall be designed for a minimum L-10 life of 75,000 hours.

Water Recirculation Pump

The pump(s) shall be a close-coupled, centrifugal type with mechanical seal, installed vertically at the factory to allow free drainage on shut down. _____ horsepower totally enclosed motor(s) shall be furnished suitable for outdoor service on _____ volts, _____ hertz, and _____ phase.

Heat Transfer Coil

Condensing coil(s) shall be all prime surface steel, encased in a steel framework and hot-dip galvanized after fabrication as a complete assembly. The coil(s) shall be designed with sloping tubes for free drainage of liquid refrigerant and shall be pneumatically tested at 390 psig, under water.

Water Distribution System

The system shall provide a water flow rate of 6 GPM over each square foot of unit face area to ensure proper flooding of the coil. The spray header shall be constructed of schedule 40 polyvinyl chloride pipe for corrosion resistance. All spray branches shall be removable for cleaning. Heavy-duty ABS spray nozzles with large 1-1/4" diameter opening and internal sludge ring to eliminate clogging. Nozzles shall be threaded into spray header to provide easy removal for maintenance.

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.

Louvers

The louvers shall be constructed from polyvinyl chloride (PVC) and mounted in a rugged steel frame. The louvers shall be mounted in easily removable sections for access to the pan for maintenance. The louvers shall have a minimum of two changes in air direction to prevent splashout and block direct sunlight.

Finish

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