Bulletin 331E

# AT/UT/USS

## COOLING TOWERS

IBC COMPLIANT DESIGNS




MOTOR AND DRIVE 5 Year WARRANTY

COMPLETE 5 YEAR PRODUCT WARRANTY STANDARD ON STAINLESS STEEL MODELS

† CTI CERTIFIED

MEMBER

MCAA SUPPLIER PARTNER Manufacturer/Supplier Council

**ADVANCED TECHNOLOGY IN INDUCED DRAFT, COUNTERFLOW COOLING TOWERS**

**33 to 5,141 NOMINAL TONS**

**(144 TO 22,596kW)**

*TECHNOLOGY FOR THE FUTURE...AVAILABLE TODAY!*

† Mark owned by the Cooling Technology Institute

# The Advanced Technology Design Providing

# AT/UT/USS

**EVAPCO, Inc.,** continues its dedication to advancements in induced draft, counterflow cooling tower technology and easy maintenance with the Advanced Technology Cooling Tower...The EVAPCO AT!

The AT is the result of decades of engineering success based on easy maintenance, durable construction and a highly efficient design. The AT brings marquee features that make it the best choice in cooling towers.




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 on five continents around the world and distributed through hundreds of factory-authorized sales representatives.



## *Totally Enclosed Fan Motors*

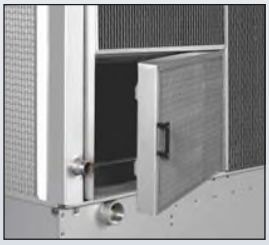
- Motors positioned for easy accessibility and extended serviceability.
- Assures long life.
- Five (5) Year motor warranty.
- Energy efficient/inverter capable motors standard on all motors.
- Optional space heaters to eliminate condensation while idle.

† CTI CERTIFIED



## *EVAPCO Power-Band Drive System*

- The AT Cooling Tower features the highly successful, easy maintenance, heavy duty Power-Band Drive System.
- Standard heavy-duty pillow block bearings with a minimum L10 life of 75,000 hours.
- Extended lube lines.
- External motor/belt adjustment.
- Solid-Back Multi-Groove Power-Band Belts and Totally Enclosed motors are standard.
- Five (5) Year Motor and Drive Warranty.



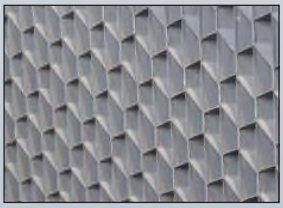
## *Louver Access Door*

- Hinged access panel with quick release mechanism.
- Allows easy access to perform routine maintenance and inspection of the makeup assembly, strainer screen and basin.
- Standard on models with louvers 5 ft. or taller.



## *Easy Field Assembly*

- A new field assembly seam design which ensures easier assembly and reduced potential for field seam leaks.
- Self-guided channels guide the fan casing section into position improving the quality of the field seam.
- Eliminates up to 66% of fasteners compared to old design.



## *WST Air Inlet Louvers (Water and Sight Tight)*

- Easily removable for access.
- Framed in same material as tower basin.
- Improved design to keep sunlight out–preventing biological growth.
- Keeps water in while keeping dirt and debris out.

U.S. Patent No. 7,927,196

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† Mark owned by the Cooling Technology Institute

## Available in 60 Cross Sections and a capacity range of 33 to 5,141 Nominal Tons (144 to 22,596 kW)! The AT has a model for every application.

If there is an application for which the standard catalog product line does not work, EVAPCO will make a cooling tower that will fit your requirement! Consult your local EVAPCO Representative or the factory for all your cooling tower needs.

### CTI Certified-Standard 201

- Independent Certification.
- Eliminates necessity for costly field performance tests.

### Optional Motor Davit and Working Platform

**Motor Davit**

- Motor davit and bracket option for easy motor removal.
- Also available for Gearbox removal.

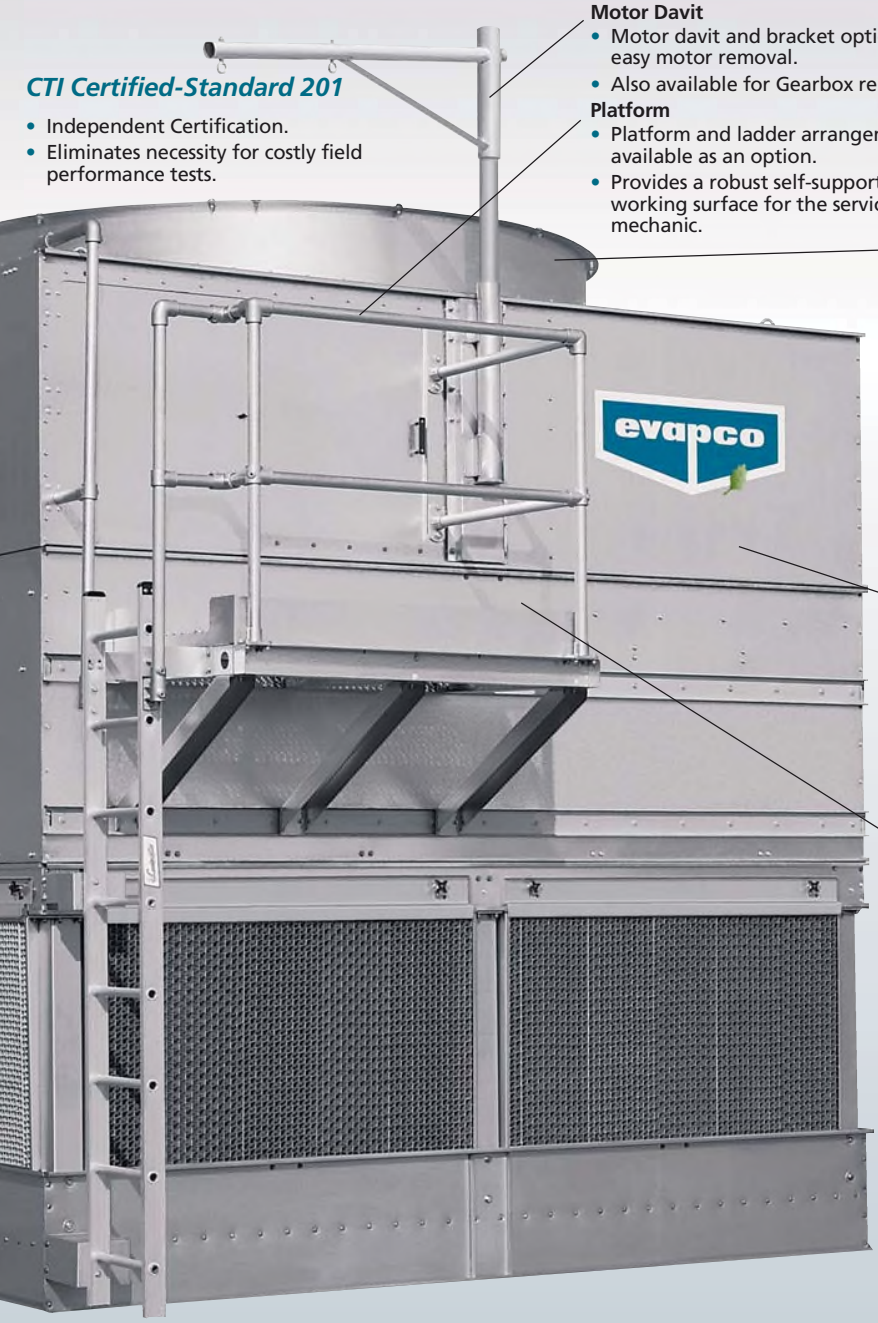
**Platform**

- Platform and ladder arrangement available as an option.
- Provides a robust self-supporting working surface for the service mechanic.

### IBC and OSHPD Designs

- All standard models meet IBC requirements for < = 1.0 g seismic or 60 psf wind loads.
- Upgraded designs which meet up to 5.12 g seismic or 145 psf wind loads are available for all models.
- Upgraded designs can also be used for projects requiring OSHPD approval.
- See pages 14-15 for more information about IBC and OSHPD.

U.S. Patent Nos.7,938,373 and 7,963,492




### Smooth Flow Fan

- Soft-connect blade to hub design.
- Variable Frequency Drive friendly
- Eliminates critical blade passing frequencies at any speed.

(Not available on 4 ft. wide models)

*See page 5 for more information.*

### Exclusive 5 Year Motor & Drive Warranty

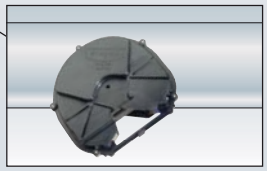
- Covers the complete drive system, including the motor.
- Covers all drive components on belt or gear drive units.
- Standard on all AT Models.
- Upgraded 5 year Complete Product warranty on models with optional stainless steel construction.

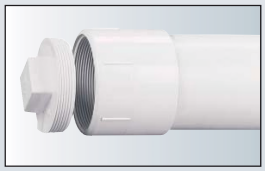



### EVAPAK® Fill

- Induces highly turbulent mixing of the air and water for superior heat transfer.
- Special drainage tips allow high water loading without excessive pressure drop.
- Flame spread rating of 5 per ASTM E84-81a.
- Can be used as an internal working platform.



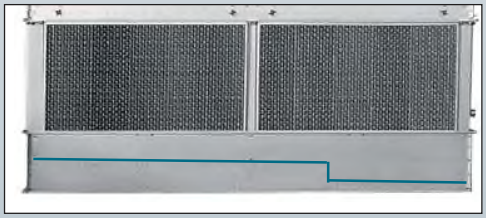




EvapJet™ Nozzle

### Water Distribution System

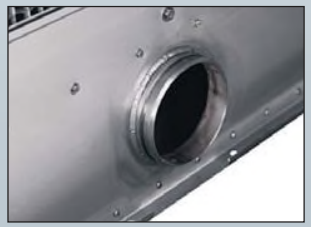
- Non-corrosive PVC construction with EvapJet™ nozzles.
- Large orifice nozzles prevent clogging and are threaded for easy removal and positive positioning.
- Each nozzle provides a large uniform spray pattern.
- System branches have threaded end caps to assist with debris removal.



### Clean Pan Sloped Basin Design

- Designed to completely drain the cold water basin.
- Helps prevent buildup of sediment and biological film.
- Eliminates standing water after drain down.

*(See details of design on page 8)*

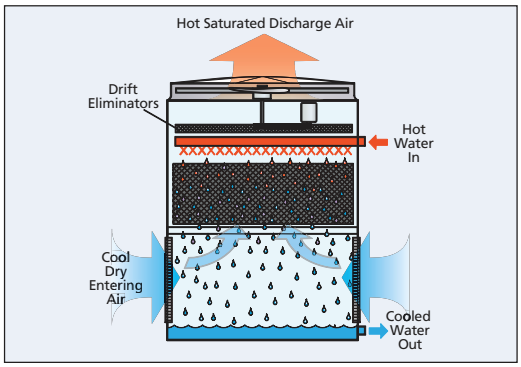


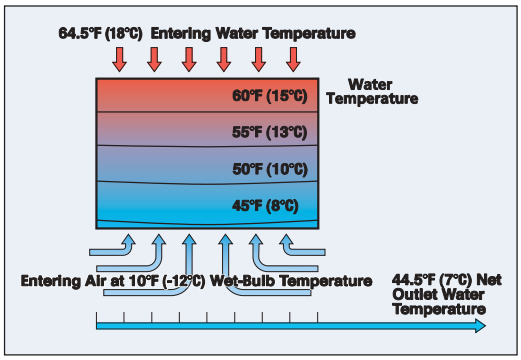
### Quick Connect Piping System

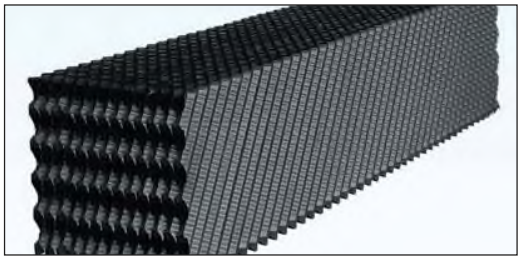
- All inlet and outlet piping connections are beveled for welding and grooved to accept a mechanical coupling device as standard, except on 4 ft. wide models which have MPT connections.
- Facilitates easy pipe connections for quick installation.
- Flanged connections are available as an option. *(See page 10 Optional Equipment)*

# The Advanced Technology Design

The AT Cooling Tower product line is an Advanced Technology design which utilizes induced draft, counterflow technology–the most efficient in the industry and the best design for operation in a freezing climate. The counterflow design provides the AT Cooling Tower with inherently better operational and maintenance features. These features are described below.





* U.S. Patent No. 5,124,087

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

## Principle of Operation

Warm water from the heat source is pumped to the water distribution system at the top of the tower. The water is distributed over the wet deck fill by means of large orifice nozzles. Simultaneously, air is drawn in through the air inlet louvers at the base of the tower and travels upward through the wet deck fill opposite the water flow. A small portion of the water is evaporated which removes the heat from the remaining water. The warm moist air is drawn to the top of the cooling tower by the fan and discharged to the atmosphere. The cooled water drains to the basin at the bottom of the tower and is returned to the heat source. For detailed layout information please consult EVAPCO's Equipment Layout Guidelines Bulletin 311.

## Optimum Design for Freezing Climates

The counterflow fill design used in the AT Cooling Tower is well suited for operation in freezing climates. The wet deck fill is totally encased and protected from freezing winds thus inhibiting ice formation in the fill section. The bonded block structure and bottom supports eliminate fill collapse should ice form.

The even temperature gradient of the counterflow design ensures all water is cooled to the same temperature. This makes the AT Cooling Tower the ideal unit for operation in freezing climates.

## EVAPAK® Fill*

The EVAPAK® fill design used in the AT Cooling Tower is specially designed to induce highly turbulent mixing of the air and water for superior heat transfer. Special drainage tips allow high water loadings without excessive pressure drop. The fill constructed of inert polyvinyl chloride, (PVC), will not rot or decay, and is formulated to withstand water temperatures of 130°F (55°C). Because of the unique way in which the crossfluted sheets are bonded together, and the bottom support of the fill section, the structural integrity of the fill is greatly enhanced, making the fill usable as a working platform for internal access to the fan and drive system. The fill selected for the AT Cooling Tower has excellent fire resistant qualities. AT Cooling Tower fill has a flame spread rating of 5 per ASTM-E84-81a.

A higher temperature fill is available for water temperatures exceeding 130°F (55°C). Consult your EVAPCO representative for further details.

## Patented** High Efficiency Drift Eliminators

An extremely efficient drift eliminator system is standard on the AT Cooling Towers. The system removes entrained water droplets from the air stream to limit the drift rate to less than 0.001% of the recirculating water rate. With a low drift rate, the AT Cooling Tower saves valuable water and can be located in areas where minimum water carryover is critical, such as parking lots.

The drift eliminators are constructed of an inert polyvinyl chloride (PVC) plastic material which effectively eliminates corrosion of these vital components. They are assembled in sections to facilitate easy removal for inspection of the water distribution system.

## Thermal Performance Guarantee

EVAPCO unequivocally guarantees the thermal performance of the AT Cooling Tower product line.



# DESIGN ADVANTAGES



## Smooth Flow Fans

The AT Cooling Tower has three fan options, standard, low sound and super low sound.

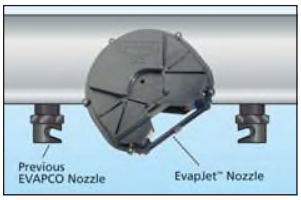
Standard fans for all units wider than 4' are axial propeller-type constructed of aluminum alloy. Standard fans for 4' wide units are also axial propeller type but have a high strength die cast aluminum hub and fiberglass reinforced polypropylene (PPG) wide chord blades. Each fan is statically balanced and installed in a closely fitted cowl with venturi air inlet for maximum efficiency. Fan screens are galvanized steel or optional Type 304 stainless steel and have steel frames bolted to the fan cowl.

See page 12 for more information on the low sound fan and Super Low Sound Fan options.



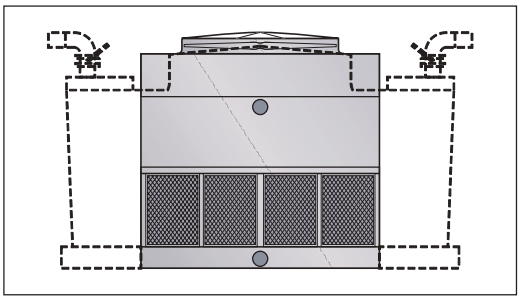
## Pressurized Water Distribution System

The water distribution system is made of schedule 40 PVC pipe and EvapJet™ ABS plastic water diffusers for corrosion protection in this key area. The piping is easily removable for cleaning. The wide orifice nozzles mounted on the side of the pipe used in the AT water distribution system help prevent clogging, reducing the maintenance costs of the water distribution system.



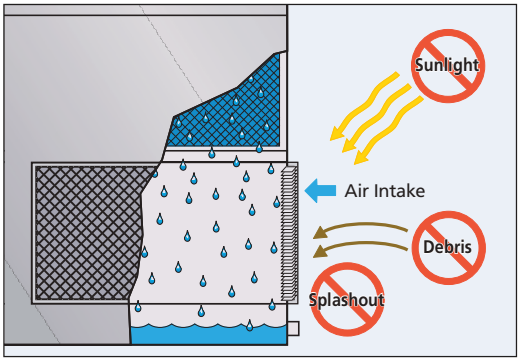

***EvapJet™ nozzle compared to previous EVAPCO nozzles***

The spray pressure for all AT Cooling Towers is between 1 and 6 psig (7 and 41 kPa) at the inlet header. The actual spray pressure will be shown on the submittal which is prepared for each unit.



## Reduced Piping Costs

Each cell of the AT Cooling Tower is furnished with one inlet and one outlet piping connection. This design reduces the amount of external piping and thereby lowers the installed cost of the cooling tower relative to crossflow cooling towers. The water distribution system is pressurized and self balancing. On single cell installations, field balancing is not required on the AT, and the need for flow balancing valves is eliminated, further reducing the cost of tower installation.




## Superior Air Inlet Louver and Screen Design***

EVAPCO'S WST Inlet Louvers keep water in and sunlight out of induced draft products. The unique non-planar design is made from light-weight framed PVC sections which have no loose hardware, enabling easy unit access.

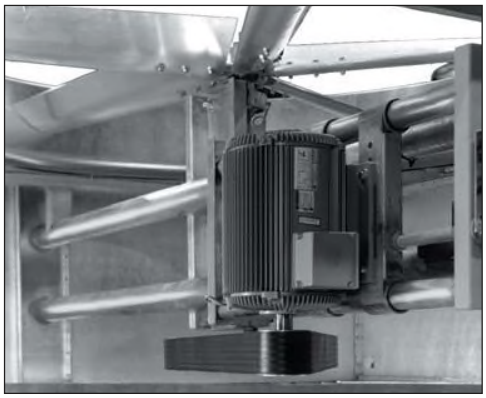
Developed with computational fluid dynamics (CFD) software, the louver's air channels are optimized to maintain fluid dynamic and thermodynamic efficiency and block all line-of-sight paths into the basin eliminating splash-out; even when the fans are off. Additionally, algae growth is minimized by blocking all sunlight.

**The combination of easy access, no splash-out and minimized algae growth saves the end user money on maintenance hours, water consumption and water treatment costs.**

*** U.S. Patent No. 7,927,196

# The Advanced Technology POWER-BAND Design Advantages

The AT Cooling Tower features the highly successful EVAPCO POWER-BAND Belt Drive System engineered for heavy-duty operation. The POWER-BAND Drive System has consistently provided trouble-free operation in the most severe duty cooling tower applications. In addition, the complete drive system including the fan motor is standard with a (5) Five Year Motor & Drive Warranty.



## Fan Motors

All AT Cooling Tower models utilize premium efficiency, inverter capable totally enclosed (T.E.F.C. or T.E.A.O.) fan motors designed specifically for cooling tower applications. In addition to the standard motors offered on each cooling tower, EVAPCO offers options to meet your specific needs, including:

- Multi-Speed Motors
- Space Heaters
- Thermistors
- Shaft Grounding Rings



## Power-Band Belt Drive

The Power-Band drive is a solid-back multigroove belt system that has high lateral rigidity. The belt is designed for cooling tower service, and is constructed of neoprene with polyester cords. The drive belt is sized for 150 percent of the motor nameplate horsepower ensuring long and trouble free operation.

## Drive System Sheaves

Drive system sheaves located in the warm, moist atmosphere inside the cooling tower are constructed of an aluminum alloy. Models with T.E.F.C. motors have a steel driver sheave protected by a hinged cover.

## Fan Shaft Bearings

The fan shaft bearings on the AT cooling tower are specially selected to provide long life, minimizing costly downtime. They are rated for a minimum L-10 life of 75,000 hours, making them the heaviest duty pillow block bearing in the industry used for cooling tower duty.




## Five Year Motor and Drive Warranty

EVAPCO provides a standard 5 year motor and drive warranty on all Power-Band belt drive and optional gear drive AT Cooling Towers. This unique warranty is designed to offer the end user optimum protection against fan drive and motor failure. It is a comprehensive plan which includes the fan, fan shaft, belts, sheaves, fan bearings, gear box, flexible coupling, driveshaft and the motor.



## Fast, On-Time Shipments

The AT is a completely factory assembled cooling tower manufactured by a dedicated professional workforce, expert in building cooling towers. Factory trained mechanics and EVAPCO's strict quality control and inspection procedures guarantee the quality of every unit shipped.

EVAPCO's controlled factory environment ensures fast on-time shipments, allowing the AT to be available...

***WHEN THE CUSTOMER WANTS IT!***

# MAINTENANCE ADVANTAGES

## The Advanced Technology Easy Maintenance Drive System

The EVAPCO POWER-BAND drive system utilized on the AT Cooling Tower is the *easiest* drive system to maintain in the industry. There is no need to stand inside the cold water basin to service the bearings, belts, gear reducers, floating shafts or electrical equipment. In addition, there is no need for fan deck handrails or safety cages, since all periodic maintenance can be safely performed from the side of the unit. The most important features of this design are listed below.

### Motor Mount, Power-Band Belt Adjustment and Bearing Lubrication Individual Cells 4' wide to 8.5' wide

The fan motor and drive assembly are designed to allow easy servicing of the motor and adjustment of the belt tension from the exterior of the unit. The Totally Enclosed Fan Cooled, T.E.F.C. fan motor is mounted on the outside on these models and is protected from the weather by a cover which swings away for maintenance.

A large hinged access door is located on the side of the unit for easy access to the fan drive system. The belt can be adjusted by tightening the J-Bolts on the motor base and the tension can be checked easily through the access door, all while standing at the side of the unit. The bearings can also be lubricated from the side of the unit. The bearing lubrication lines have been extended to the exterior casing and are located by the access door, thus making bearing lubrication easy.





*Sloped maintenance ladders and working platforms are available as an option to facilitate maintenance. See page 9, Optional Equipment, for details.*

### Individual Cells wider than 8.5'





The Totally Enclosed Air Over, T.E.A.O. fan motor is located inside the fan casing on the large AT Cooling Tower and is mounted on a rugged heavy duty motor base. The motor base is designed to swing completely to the outside of the unit through a very large hinged (14 square feet) (1.3 square meters) access door greatly simplifying motor maintenance.

The unique swinging motor mount designed for these models features easy belt adjustment from the exterior of the unit. The T.E.A.O. fan motor is mounted on an adjustable base which is supported by two heavy duty pipes. The belt is adjusted by tightening an all-thread which runs through the motor base.

The innovative motor base features a unique locking mechanism for a positive belt adjustment and is also used to adjust the belt tension if a wrench is not available.

Bearing lubrication fittings are extended to the side of the unit inside the access door to allow easy application of the bearing lubricant. This external location allows for easy servicing of the bearings and is another important advantage of EVAPCO equipment.



*To facilitate motor removal, an optional motor davit is available. See Optional Equipment on page 9 of this brochure.*

# The Advanced Technology Easy Maintenance Basin Design

The cold water basin is the most important area of a cooling tower to maintain. As a result of the evaporation process and the direct contact of the water with air in a cooling tower, dirt and debris will collect in the basin and must be cleaned out on a regular basis. EVAPCO's AT basin section is designed to allow quick and easy access—promoting routine maintenance of the cold water basin. The basin features the following:



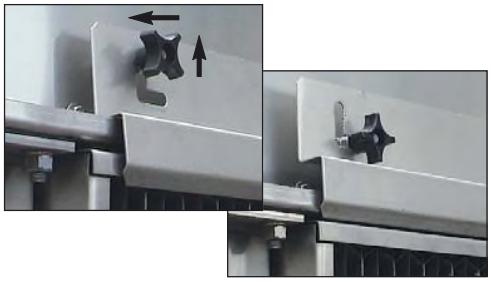
## Easy Access

The cold water basin section is easily accessible from ground level by simply loosening the (2) two Quick Release Fasteners on the inlet louver assemblies surrounding the cooling tower and lifting out the lightweight louver.

The basin can be accessed from all (4) four sides of the cooling tower. The bottom of the fill section is a minimum of four (4) feet (1.2m) above the basin floor. This open basin design enables the AT basin to be easily cleaned. The 4' wide models are accessible on only two sides.

## Louver Access Door

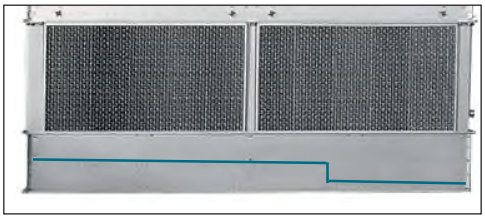
To aid in basin maintenance, most AT models can be equipped with an optional louver access door. This feature allows easy access to perform routine maintenance and inspection of the makeup assembly, strainer screen and basin without removing an entire inlet louver. This feature is standard on models with louvers 5' or taller and optional on models with 4' tall louvers.



## Easy, Removable Air Inlet Louvers with Quick Release Fasteners

The AT features a Quick Release Fastener design consisting of (2) two large thumbscrews and a retaining bracket system. By loosening the thumbscrews, the retaining bracket lifts away from the louver frame, allowing the louver to be removed while the retaining bracket and thumbscrews stay on the cooling tower.

- Design allows quick removal of louvers.
- Louver fastener is large and easy to release.
- Louver fastener remains on the unit–eliminating the possibility of missing hardware.



## Clean Pan Basin Design

The AT features a completely sloped basin from the upper to lower pan section. This "Clean Pan" design allows the water to be completely drained from the basin. The cooling tower water will drain from the upper section to the depressed lower pan section where the dirt and debris can be easily flushed out through the drain. This design helps prevent buildup of sedimentary deposits, biological films and minimizes standing water.

Note: on 4' wide units, the pan is sloped without the step



## Stainless Steel Strainers

The EVAPCO standard for many years, the stainless steel strainer is one component of the cooling tower subject to excessive wear and corrosion. With the standard stainless steel construction, this component will last the life of the cooling tower.

# Optional Equipment

The standard design of the EVAPCO AT provides the customer with the *easiest* cooling tower to maintain in the industry. There are additional options which can make maintenance easier and extend the life of the cooling tower. These options are listed below.



## Sloped Maintenance Ladders

The EVAPCO designed maintenance ladder features a sloped "ships type" ladder which provides visual inspection of the water distribution system and drive components. All standard drive system maintenance can be performed from the ladder. A handrail is attached to the sloped ladder for safe and easy ascent and descent. There is no need for safety cages with this design. The ladder will ship loose and must be field mounted. The design is OSHA compliant.

*Note: The sloped maintenance ladder is available on all models wider than 4'. A vertical ladder is available on all 4' wide models.*

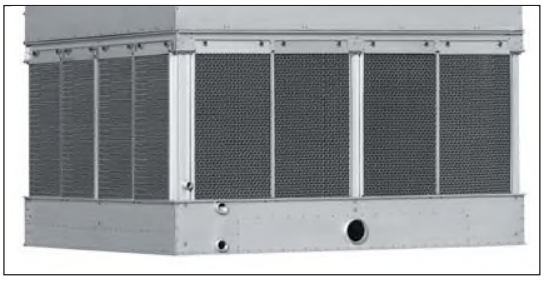


## Working Platform & Ladder with Davit

AT Cooling Towers are available with an external working platform and ladder to allow easy servicing of the fan motor and water distribution system. Providing a convenient platform to perform work, the heavy duty galvanized steel platform is self-supporting. A less expensive alternative to field erected catwalks, the working platform option uses a straight ladder as standard and ships in sections for easy installation. The working platform and ladder designs are OSHA compliant.

*Note: The Working Platform is not available on 4 ft. wide models.*

The optional davit eliminates crane rentals and facilitates the removal of motors, gear drives and fans. The davit is constructed of aluminum. The galvanized steel bracket is mounted on the side of the unit. The davit ships loose and is installed in the field.



## Stainless Steel Water Touch Basin

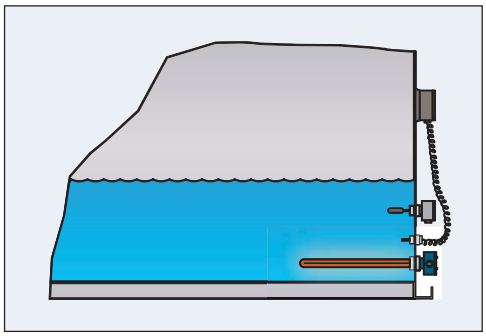
The AT Cooling Tower has a modular design which allows specific areas to be enhanced for increased corrosion protection. The basin area of the cooling tower experiences turbulent mixing of air and water, in addition to silt build-up. This option provides Type 304 or Type 316 stainless steel for the entire basin area including the support columns and plenum of the cooling tower and the louver frames.

The basin section provides the structural support for the unit and is the most important part of the cooling tower. The Stainless Steel Water Touch Basin provides maximum corrosion protection.



## Basin Level Platform

A basin level platform and ladder to allow easy servicing of the cold water basin is available on some box sizes. For cooling towers above ground level the basin level platform facilitates standard inspections and maintenance, such as float assembly adjustment and basin and suction strainer cleaning. The platform is supported from the unit, but the ladder requires field support. The platform and ladder ship in modules for easy installation.



## Electric Heaters

Electric immersion heaters are available as an option and are located in the basin of the tower. They are sized to maintain a +40° F (4.5°C) pan water temperature with the fans and system pumps off*. They are furnished with a thermostat and low water protection device to cycle the heater on when required and to prevent the heater elements from energizing unless they are completely submerged. All components are enclosed in rugged, weather proof enclosures for outdoor use. Heater control packages that include contactor, transformer or disconnects are available, consult your local EVAPCO representative.

* See page 11 for heater size information.



## Electronic Water Level Control (EWLC)

EVAPCO cooling towers are available with an optional electronic water level control system in place of the standard mechanical makeup and float assembly. This package provides very accurate control for the basin water level and does not require field adjustment, even under varying operating conditions.

The controls were designed by EVAPCO and are manufactured exclusively for EVAPCO. They consist of multiple heavy duty stainless steel electrodes. These electrodes are mounted on the outside of the unit in a vertical stand pipe which acts as a stilling chamber. For winter operation, the stand pipe must be wrapped with electric heating cable and insulated to protect it from freezing. Electronic water level control packages are available with 3 or 5 probes. The 5 probe package provides high and low level alarms.

The weather protected slow closing solenoid valve for the makeup water connection is factory supplied and is ready for piping to a water supply with a pressure between 5 and 125 psig (34 and 862 kPa).



Flanged Connections



Bypass Connections with Diffuser Hood



Equalizers and Flume Plates

## Other Options

- **Vibration Switches**
- **Sump Sweeper Piping**
- **FM Approval**
- **Alternate Fills for dirty water/environment applications**
- **Bottom Inlet and Bottom Suction Connections**
- **Remote Sump Connections** (see page 66 for more information)
- **Materials for Higher Temperature Applications**
- **Titan-Pak Stainless Steel Fill**

## Technical Support Services

### evap*Select*®

evap*Select*® is a computer selection program which allows the design engineer to choose EVAPCO models and optimize unit selections. The program allows the engineer to evaluate the equipment's thermal performance, space and energy requirements. Once the model is selected and optional equipment features are inserted, the engineer may generate a complete specification **AND** a unit drawing from this program. The software is designed to provide the user with maximum flexibility in analyzing the various selection parameters while in a friendly and familiar Windows format.

The evap*Select*® software program may be accessed after contacting your local EVAPCO sales representative. Users may make Requests for Quotations through the website or by e-mailing EVAPCO at this address marketing@evapco.com

### EVAPCO's Website

Log on to EVAPCO's website http://www.evapco.com for expanded product information. The website contains a multitude of information and resources including the following:

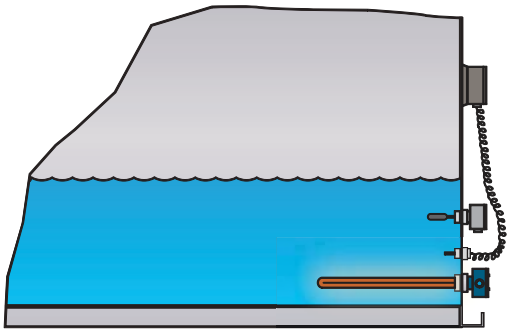
- Unit certified drawings (.pdf format)
- Steel support drawings (.pdf format)
- Scaled isometric views of towers in CAD (.dwg format)
- 3-D models of towers in Revit (.rfa format)
- Product literature
  - Catalogs
  - Rigging instructions
  - Operation and Maintenance Instructions
  - Videos
- Logo apparel and merchandise.

***With evapSelect®, equipment selections, written specifications, unit drawing files and EVAPCO on-line information are readily available from the comfort of your own office!***

# ELECTRIC BASIN HEATER SIZES

## Electric Basin Heaters

Electric immersion heaters are available factory-installed in the basin of the towers. Standard Heaters 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. The heater option includes a thermostat and low-water protection device to control the heater and to prevent it 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.



**AT/UT/USS Heater Sizes ***

| | Model No. | 0°F kW | -20°F kW | -40°F kW |
|---|---|---|---|---|
| 1-CELL | 14-64 to14-94 | 2 | 3 | 4 |
| | 14-66 to 14-96 | 3 | 4 | 5 |
| | 14-69 to 14-99 | 4 | 5 | 7 |
| | 14-612 to 14-912 | 5 | 7 | 9 |
| | 19-56 to 19-96 | 5 | 7 | 9 |
| | 19-28 to 19-98 | 6 | 8 | 12 |
| | 19-59 to 19-99 | 7 | 10 | 15 |
| | 19-111 to 19-911 | 8 | 12 | 15 |
| | 19-412 to 19-912 | (2) 4 | (2) 7 | (2) 9 |
| | 19-114 to 19-914 | (2) 5 | (2) 7 | (2) 10 |
| | 110-112 to 110-912 | (2) 5 | (2) 8 | (2) 10 |
| | 110-118 to 110-918 | (2) 7 | (2) 12 | (2) 15 |
| | 112-012 to 112-912 | (2) 6 | (2) 9 | (2) 12 |
| | 112-314 to 112-914 | (2) 7 | (2) 10 | (2) 15 |
| | 112-018 to 112-918 | (2) 9 | (2) 15 | (2) 18 |
| | 112-520 to 112-920 | (2) 10 | (2) 15 | (3) 15 |
| | 114-0124 to114-1324 | (2) 16 | (3) 16 | (3) 20 |
| | 114-526 to 114-926 | (2) 16 | (3) 16 | (3) 20 |

**AT/UT/USS Heater Sizes ***

| | Model No. | 0°F kW | -20°F kW | -40°F kW |
|---|---|---|---|---|
| 2-CELL | 26-517 to 26-917 | (2) 5 | (2) 7 | (2) 9 |
| | 28-217 to 28-917 | (2) 6 | (2) 8 | (2) 12 |
| | 29-318 to 29-918 | (2) 6 | (2) 9 | (2) 12 |
| | 29-121 to 29-921 | (2) 7 | (2) 12 | (2) 15 |
| | 29-024 to 29-924 | (4) 4 | (4) 7 | (4) 9 |
| | 29-228 to 29-928 | (4) 5 | (4) 7 | (4) 10 |
| | 210-124 to 210-924 | (4) 5 | (4) 8 | (4) 10 |
| | 210-136 to 210-936 | (4) 7 | (4) 12 | (4) 15 |
| | 212-59 to 212-99 | (2) 5 | (2) 7 | (2) 9 |
| | 212-024 to 212-924 | (4) 6 | (4) 9 | (4) 12 |
| | 212-128 to 212-928 | (4) 7 | (4) 10 | (4) 15 |
| | 212-036 to 212-936 | (4) 9 | (4) 15 | (4) 18 |
| | 214-0148 to214-1248 | (4) 16 | ** | ** |
| | 214-552 to 214-952 | (4) 16 | ** | ** |
| | 215-29 to 215-99 | (2) 6 | (2) 8 | (2) 12 |
| | 217-59 to 217-99 | (2) 7 | (2) 10 | (2) 15 |
| | 217-111 to 217-911 | (2) 8 | (2) 12 | (2) 15 |
| | 217-412 to 217-912 | (4) 4 | (4) 7 | (4) 9 |
| | 217-214 to 217-914 | (4) 5 | (4) 7 | (4) 10 |
| | 220-112 to 220-912 | (4) 5 | (4) 8 | (4) 10 |
| | 220-118 to 220-918 | (4) 7 | (4) 12 | (4) 15 |
| | 224-018 to 224-918 | (4) 9 | (4) 15 | (4) 18 |
| | 224-720 to 224-920 | (4) 10 | (4) 15 | (4) 20 |
| | 228-0124 to 228-1024 | (4) 16 | ** | ** |
| | 228-526 to 228-926 | (4) 16 | ** | ** |
| 3-CELL | 39-336 to 39-936 | (6) 4 | (6) 7 | (6) 9 |
| | 39-242 to 39-942 | (6) 5 | (6) 7 | (6) 10 |
| | 310-136 to 310-936 | (6) 5 | (6) 8 | (6) 10 |
| | 310-154 to 310-954 | (6) 7 | (6) 12 | (6) 15 |
| | 312-036 to 312-936 | (6) 6 | (6) 9 | (6) 12 |
| | 312-042 to 312-942 | (6) 7 | (6) 10 | (6) 15 |
| | 312-054 to 312-954 | (6) 9 | (6) 15 | (6) 18 |
| | 312-260 to 312-960 | (6) 10 | (6) 15 | (9) 15 |
| | 314-0172 to 314-1272 | (6) 16 | ** | ** |
| | 314-578 to 314-978 | (6) 16 | ** | ** |
| | 342-526 to 342-926 | (6) 16 | ** | ** |
| 4-CELL | 420-124 to 420-924 | (4) 10 | (4) 15 | (4) 20 |
| | 420-136 to 420-936 | (4) 15 | (4) 15 | (4) 20 |
| | 424-024 to 424-924 | (4) 12 | (4) 18 | (6) 15 |
| | 424-028 to 424-928 | (4) 15 | (4) 20 | (6) 18 |
| | 424-036 to 424-936 | (4) 18 | (6) 18 | (8) 18 |
| | 428-0148 to 428-1348 | (8) 16 | ** | ** |
| | 428-552 to 428-952 | (8) 16 | ** | ** |
| | 456-526 to 456-926 | (8) 16 | ** | ** |

* Electric heater selection based on ambient air temperature shown.
** Consult Factory

# The Expanded Family of the EVAPCO *Super* Low Sound Fans!

For more information see Sound Basics on pages 19-21.



## Super Low Sound Fan 9 – 15 dB(A) Reduction!

The Super Low Sound Fan offered by EVAPCO utilizes an extremely wide chord blade design for sound sensitive applications where the lowest sound levels are desired. The fan is two-piece molded heavy duty FRP construction utilizing a forward swept blade design. The Super Low Sound fan is capable of reducing the unit sound pressure levels **9 dB(A) to 15 dB(A)**, depending on specific unit selection and measurement location compared to the original AT fan. The Super Low Sound Fan will have no impact on unit thermal performance and is **CTI certified**.

*A Cooling Tower with a Super Low Sound Fan is designated as an UT, unless it is constructed of stainless steel in which case it is designated as an USS*

***Note:*** *The Super Low Sound Fan is not available on 4 ft wide models.*

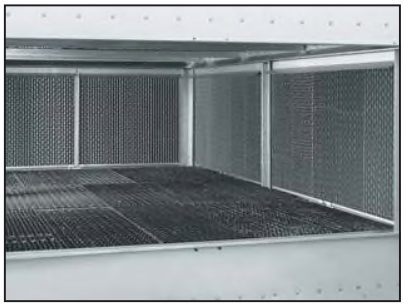


## Low Sound Fan* 4 – 7 dB(A) Reduction!

The Low Sound Fan offered by EVAPCO is a wide chord blade design for sound sensitive applications where low sound levels are desired. The Low Sound Fan shall utilize a unique soft-connect blade-to-hub design that is compatible with Variable Speed Drives. Since the blades are not rigidly connected to the fan hub, no vertical vibration forces are transmitted to the unit structure which reduces sound pressure levels **4 dB(A) to 7 dB(A)**, depending on specific unit selection and measurement location. The fans are high efficiency axial propeller type and are **CTI Certified** on the AT line of Cooling Towers.

See page 13 for low sound height and operating weight additions.
*The Low Sound Fan is NOT available on the UT Cooling Tower.*

** The CTI Certified Low Sound Fan will have a thermal performance derate up to 3.5%. Consult the factory or evapSelect® Program for actual thermal performance.*



## Water Silencer—Reduces Water Noise in the Cold Water Basin up to 7 dB(A)!

The water silencer option is available for all induced draft models and is located in the falling water area of the cold water basin. The water silencer will reduce the high frequency noise associated with the falling water and is capable of reducing overall sound levels **4 dB(A) to 7 dB(A)** measured at 5 ft. from the side or end of the unit. The water silencers reduce overall sound levels **9 dB(A) to 12 dB(A)** (depending on water loading and louver height) measured 5 ft. from the side or end of the unit when water is circulated with fans off.

The water silencers are constructed of lightweight PVC sections and can be easily removed for access to the basin area. The water silencer will have no impact on thermal performance and is **CTI Certified**.

*The Water Silencer is available on AT, USS and UT Cooling Towers.*

***Note:*** *Water Silencers are not available on 4 ft. wide models.*



## Offset Sound Attenuation Walls

Offset Sound Attenuation Walls are EVAPCO's newest **CTI Certified** attenuation option for even greater levels of sound reduction when used in combination with the Super Low Sound Fan and Water Silencer options. The addition of Offset Sound Attenuation Walls will typically reduce the 50 ft. free field sound level by an additional **3 db(A)**. The walls are constructed of G-235 galvanized steel (stainless steel construction also available) lined with acoustical padding on the inside of the walls. This option requires external support by others.

*Offset Sound Attenuation Walls are available on ALL AT, USS, and UT Cooling Towers with Super Low Sound Fan and Water Silencer options selected*

## IBC - International Building Code

The International Building Code (IBC) is a comprehensive set of regulations addressing both the structural design and the installation requirements for building systems – including HVAC and industrial refrigeration equipment. All state and local jurisdictions have adopted the IBC or revised their local codes to mimic verbatim the IBC, including California's Building Code (CBC).

- Provisions in the IBC require that evaporative cooling equipment attached to a building must be designed to withstand the same seismic and wind loads as the building.
- When the equipment is attached to a critical facility, its ability to withstand the seismic load must be independently certified by a professional approval agency.

## Structural Design Selection

EVAPCO applies the seismic design and wind load information provided for the project to determine the equipment design necessary to meet IBC requirements. Based on the project zip code and site design factors, calculations are made to determine the equivalent seismic "g force" and wind load (in pounds per square foot, psf) on the unit. ***Whichever design force – seismic or wind- is more severe for the building, governs the design of the building and all attached equipment.***

The AT is offered with a choice of TWO structural design packages:

- Standard Structural Design – For projects with ≤ 1.0 g seismic or 60 psf wind loads
- Upgraded Structural Design – Required for projects with >1.0 g or 60 psf wind loads and designed to meet highest seismic, 5.12 g or wind loads, 145 psf identified by IBC.

When using the EVAPCO selection software to make a selection, these calculations can be incorporated into the selection process. Simply enter the required factors and the Seismic Design Force and Wind Load will be calculated automatically.

Note: IBC 2012 Section 1603 requires all necessary information for determining seismic (and wind) loads to be provided in the Engineer-supplied Construction Documents.

U.S. Patent Nos. 7,938,373 and 7,963,492

## Independent Certification

ALL installations – Seismic or Wind Load – must meet the loads as outlined in the code. Additionally the IBC requires *independent seismic certification* for a specific category of installations. Installations that have a dominant seismic load and meet additional criteria, such as essential Occupancy categories, must be independently certified.

Equipment meeting the criteria must include all of the following:

1) Independent certification by a qualified professional engineer;
2) Labeling of the equipment;
3) A certificate of compliance by the manufacturer that is certified by the 3rd party engineer.

EVAPCO supplies a certificate of compliance as part of its submittal documents.

**In accordance with IBC 2012, EVAPCO's product lines have been independently certified that they can withstand seismic loads up to 1.0g or wind loads up to 60 psf in the standard design and 5.12g or 145 psf in the upgraded design.**

**OSHPD** - California's **O**ffice of **S**tatewide **H**ealth **P**lanning and **D**evelopment

California's Office of Statewide Health Planning and Development (OSHPD), which is responsible for interpretation of the CBC, issued a Code Application Notice (CAN 2-1708A.5, effective 10/31/2008 and latest revision 6/29/2009) where interpretations were detailed. OSHPD ruled that equipment with active components (such as the fan/drive system in a cooling tower) must be shake table tested.

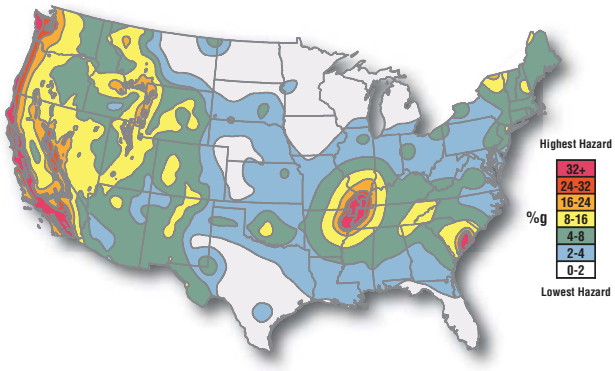
EVAPCO used the OSHPD interpretation as an opportunity to take a leadership role in the industry. EVAPCO engaged two laboratories to perform multiple shake table tests between September 2009 and November 2010. The shake table test program validated our previous analysis and resulted in the independent certification and OSHPD approval of AT Cooling Towers with the upgraded structural design, OSP-0111-10.

Please note, all units sold into OSHPD governed projects must include the upgraded ("5.12g") design.

For questions regarding IBC or OSHPD compliance, please contact your local EVAPCO Representative or visit www.evapco.com.

## Seismic Design

The chart shown below, from the US Geological Survey Website http://www.usgs.gov/ shows the potential seismic activity in the United States. Buildings constructed in the red, orange and yellow areas of the map are most likely to require the upgraded AT construction design based on the site seismic design factors. Critical use facilities, such as hospitals, are also more likely to require the upgraded design.




*Map courtesy US Geological Survey website*

# IBC–International Building Code

## Seismic Design (cont.)

The project architect or civil engineer is responsible for determining the seismic design factors to be used for the building design. A mechanical consulting engineer and/or design build contractor will then apply these factors to a series of charts and graphs to determine the appropriate seismic design factors based on the location of the installation and ultimately the "importance" of the facility.

Design Facts:

- More than 80% of the United States has design criteria resulting in a seismic design force of 1.0g or below. These sites will be provided with the standard AT structural design.
- An upgraded structural design is available for installations with design criteria resulting in "g forces" greater than 1.0g.
- The highest "g force" location in North America is 5.12g. Therefore, the upgraded structural design package option for the AT is designed for 5.12g the AT applicable to ALL building locations in North America.
- There is no good translation from "g" to other seismic scales, such as the Richter scale.



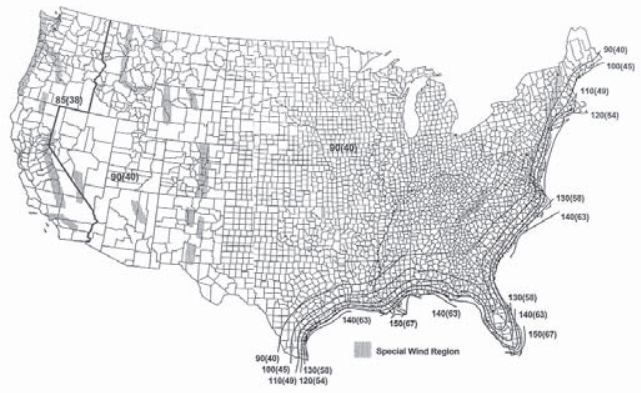
*Seismic Test Chamber*

## Wind Design

The IBC 2012 code book includes a map of basic wind speed (3-second gust) by contour lines. However, local regulations may be more stringent than these published speeds.

Whichever design force - seismic or wind - is more severe for the building, governs the design of the building and all attached equipment.

- More than 80% of the United States has design criteria resulting in a wind load of 60 psf or below. These sites will be provided with the standard AT structural design.
- An upgraded structural design is available for installations with design criteria resulting wind loads greater than 60 psf. These sites are most prevalent along the Gulf and Atlantic coast of the United Stated.
- The highest wind load shown on the IBC maps is (170 mph located in Guam) 150mph in the 50 states, which is approximately equal to 145 psf velocity pressure. Therefore, the upgraded structural design package option for the AT is designed to withstand 145 psf making the AT applicable to ALL building locations in North America.




*Wind Load Map Courtesy IBC 2012 Text –*
*See full-sized map for location specific values*

# *Pulse*~Pure® Water Treatment System

The AT is available with EVAPCO's optional ***Pulse*~Pure**® non-chemical water treatment system. The ***Pulse*~Pure**® Water Treatment System utilizes pulsed-power technology to provide CHEMICAL FREE Water Treatment and is an environmentally responsible alternative for treating water in evaporative cooled equipment. It does not release harmful by-products to the environment and eliminates costly chemicals completely from tower drift and blowdown. The ***Pulse*~Pure**® system delivers short, high-frequency bursts of low energy electromagnetic fields to the recirculating water in the AT and will:

- Control Bacteria to Levels Well Below Most Chemical Water Treatment Programs.
- Control the Formation of Mineral Scale on Heat-Exchange Surfaces.
- Save Water by Operating at Higher Cycles of Concentration.
- Yield Corrosion Rates Equivalent to Most Chemical Water Treatment Programs.

EVAPCO's ***Pulse*~Pure**® Water Treatment System on the AT includes integral cutting edge conductivity control and blowdown packages that are contained in a single feeder panel.

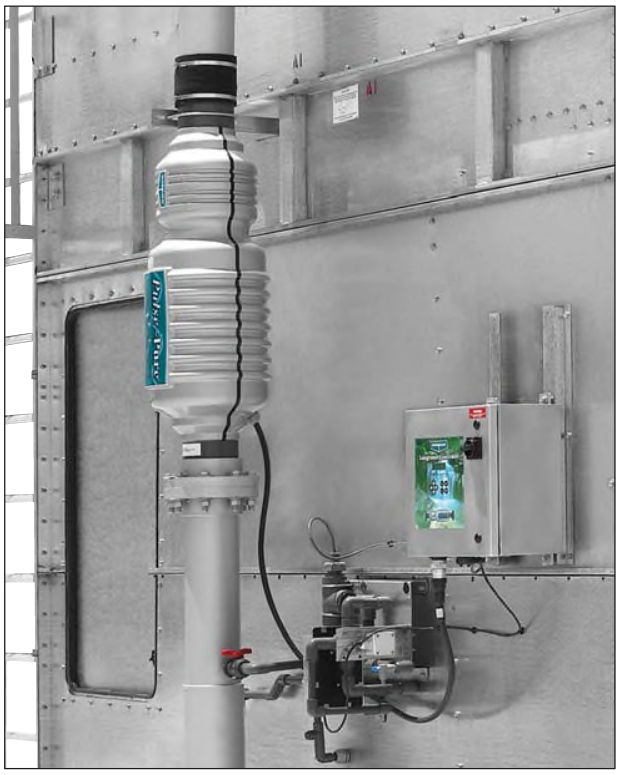
**Conductivity Control Package** – Measures Conductivity Utilizing a Non-Fouling Torodial Probe and Features:

- One power connection of 120, 230 or 460 volt is all that is required.
- USB port for downloadable 60 day audit trail of system operation.

**Motorized Blowdown Valve** – Standard for the most reliable operation in bleed control. Two-way valve operation provides good bleed flow.

Because ongoing water treatment service is an absolute requirement for any evaporative cooled system, each purchase of a ***Pulse*~Pure**® Water Treatment System includes, as standard, a 1 year water treatment service and monitoring contract provided by your factory trained EVAPCO Service Representative.

**EVAPCO's *Pulse*~Pure® system offers AT owners a single-source of responsibility for equipment, water treatment and service.**



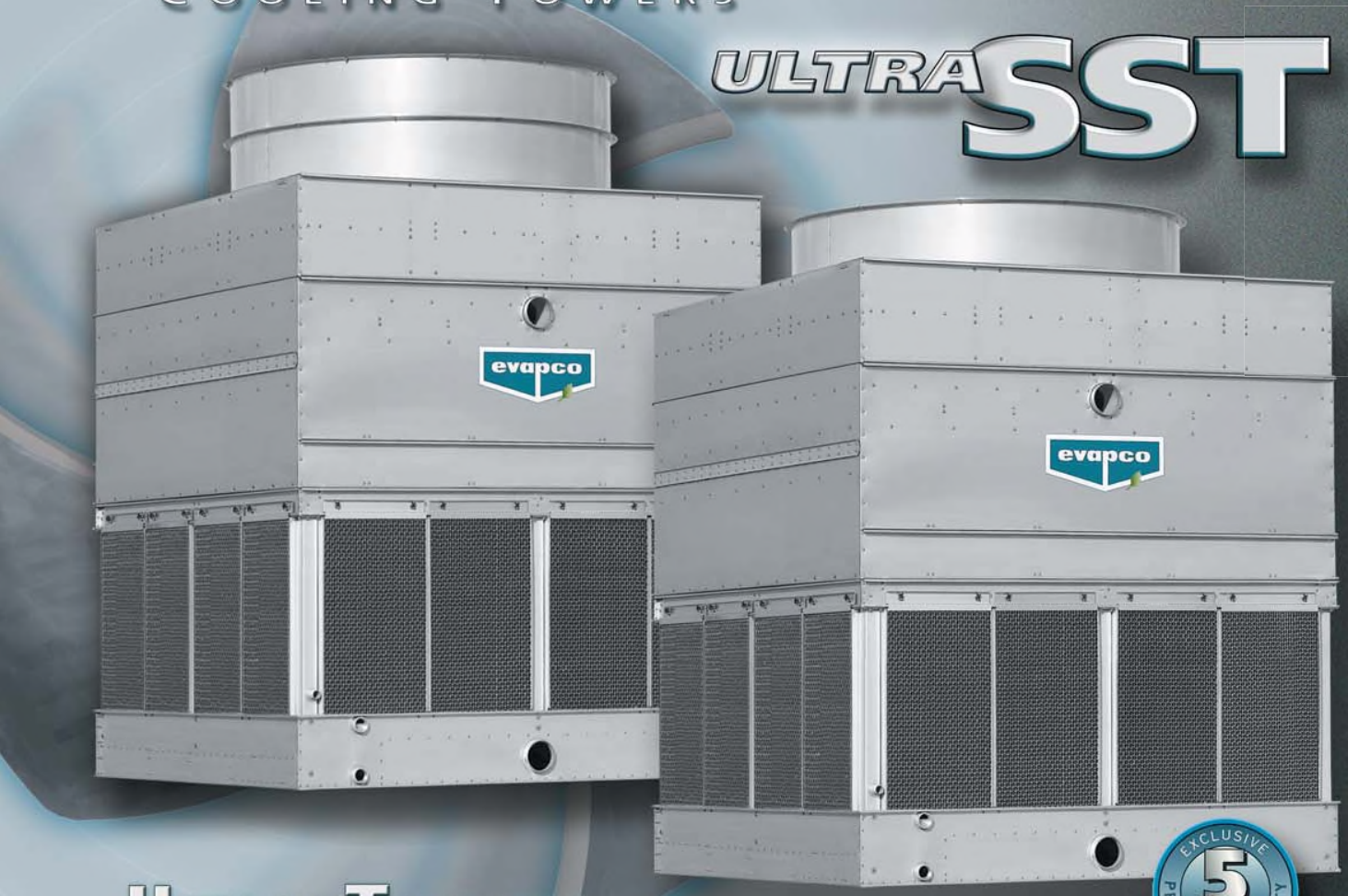
U.S. Patent Nos. 7,704,364 and 7,981,288

GreenSpec® LISTED

evapco®

# ULTRA-QUIET
COOLING TOWERS

## ULTRA SST




304 ss

316 ss

EXCLUSIVE 5 Year PRODUCT WARRANTY

**ULTRA-QUIET OPERATION IN INDUCED DRAFT, COUNTERFLOW COOLING TOWERS**

**100% CORROSION-RESISTANT TOWER**

† CTI CERTIFIED

MCAA SUPPLIER PARTNER Manufacturer/Supplier Council

U.S. GREEN BUILDING COUNCIL MEMBER

MADE IN USA

*TECHNOLOGY FOR THE FUTURE, AVAILABLE TODAY!*

† Mark owned by the Cooling Technology Institute

# ULTRA QUIET SUPER LOW SOUND FAN

## Solutions for Sound Sensitive Applications

The **ULTRA-QUIET**® Cooling Tower comes standard with Super Low Sound Fan that reduces the overall sound generated from the top of the cooling tower. The **ULTRA-QUIET**® cooling tower provides deep sound reductions and can be used in combination with Water Silencers to produce the lowest sound levels commercially available. Consult EVAPCO's evap*Select*® selection software for unit sound levels. If a detailed analysis or full octave band datasheet is required for your application, please consult your EVAPCO Sales Representative.

10 dB(A) decrease is half as loud! The **ULTRA-QUIET**® tower reduces noise pollution by **more than 50%**.
*(For more information see Sound Basics on pages 19-21)*

† CTI CERTIFIED

***CTI Certified-Standard 201***

- Independent Certification.
- No costly field performance tests required.



### The Super Low Sound Fan

#### Reduced Sound Levels versus Model AT Standard Fan

EVAPCO's Super Low Sound Fan on the **ULTRA-QUIET**® cooling tower utilizes an extremely wide chord blade design available for sound sensitive applications where the lowest sound levels are desired. The fan is two-piece molded heavy duty FRP construction utilizing a forward swept blade design. The Super Low Sound Fan reduces sound levels 9 to 15 dB(A) compared to the Model AT standard fan. *(Not available on 4 ft. wide models)*

***All of the same great features as an AT tower with a quieter fan.***



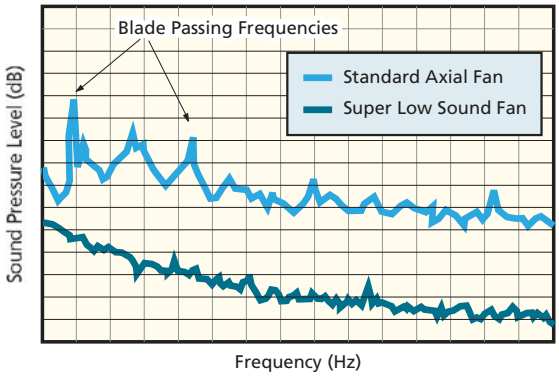

*The Super Low Sound Fan on the* **ULTRA-QUIET**® *Cooling Tower reduces sound levels and improves the sound quality!*

### Improved Sound Quality versus Model AT Standard Fan

The SUPER Low Sound Fan on the **ULTRA-QUIET**® cooling tower reduces sound levels 9-15 dB(A) and eliminates audible blade passing frequencies indicative of straight bladed axial type fans.

Refer to the Narrow Band Spectrum graph which shows how straight bladed axial fans produce blade passing frequencies – the same phenomena that produce the signature pulsating helicopter noise.

The blade passing frequencies are audible spikes in sound pressure levels, but are not apparent in the octave band sound spectrum.




Narrow Band Spectrum Analysis

# Background in Sound Basics

## Sound

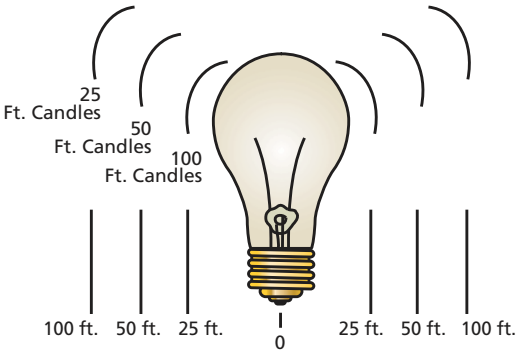
Sound is the alteration in pressure, stress, particle displacement and particle velocity, which is propagated in an elastic material. Audible sound is the sensation produced at the ear by very small pressure fluctuations in the air.

## Sound Pressure

Sound pressure is the *intensity* of sound. Sound pressure, $L_p$ in decibels is the ratio of measured pressure, P in the air to a reference sound pressure, $P_O = 2x10^{-5}$ Pascal following the following formula:

$L_p$ (dB) = 10 $\log_{10}$ ($\triangle P^2/\triangle P_O^2$)

The most important point to understand about sound pressure level is that **sound pressure level is what is actually being measured when sound data is recorded**. Microphones that measure sound are pressure sensitive devices that are calibrated to convert the sound pressure waves into decibels.




"SOUND PRESSURE"

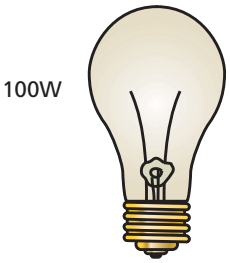
Similar to the intensity coming from a light bulb which gets dimmer as one gets further and further away, sound pressure decreases in decibels as your ear gets further from the sound source.

## Sound Power

Sound Power is the *energy* of sound. Sound power, $L_w$ in decibels is the ratio of the calculated sound power, W to a reference power, $W_o$ =1 picowatt, according to the following formula:

$L_w$ (dB) = 10 $\log_{10}$ ($W/W_o$)

The most important point to remember about sound power level is that **sound power level is not a measured value, but is calculated based on the measured sound pressure**.



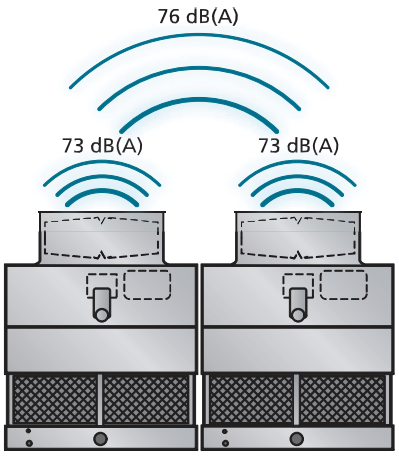

"SOUND POWER"

Similar to the wattage of a light bulb that does not change the farther one is away from the light bulb, sound power does not vary with distance.

## Adding Multiple Sound Sources

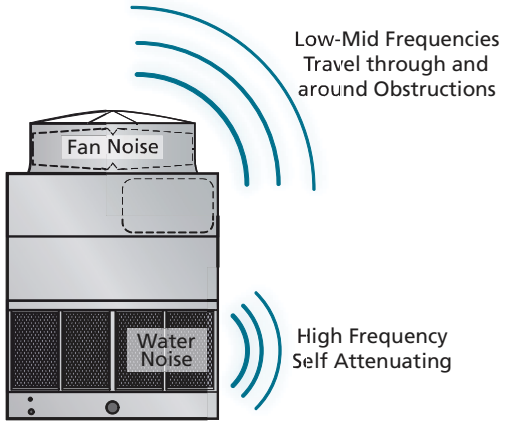
Since the decibel is a logarithmic function, the numbers are not added linearly. Therefore, two 73 dB sound sources added together do not equal 146 dB. The resultant sound would actually be 76 dB. The following table shows how to add decibels from two sound sources.

| Difference in dB Level | Add to the higher dB Level |
|---|---|
| 0 to 1 | 3 |
| 2 to 3 | 2 |
| 4 to 8 | 1 |
| 9 or greater | 0 |



# Sound Science and Cooling Towers

## Sound Frequency




### Fan Noise

- Low / Mid frequencies that travel long distances, through walls, and around obstructions.
- Very difficult to attenuate. Reduce fan noise by using Low Sound Fans.
- Dominates what is measured and heard at the cooling tower and at the sound sensitive location.

### Water Noise

- High frequencies that attenuate naturally with distance. Attenuated easily by walls, trees or other obstructions.
- Totally masked and drowned out by fan noise at a short distance away from the cooling tower.

## Sound Pressure – The A-Weighted Scale

The A-weighted scale, dB(A) is a means to translate what a sound meter microphone measures to how the human ear perceives the sound.

### dB(A) Formula and Conversions:

$$dB(A) = 10 \log_{10} \sum_{f=63}^{f=8000} 10^{((dB+C_f)/10)}$$

where: $C_f$ = correction factor per band
dB = measured sound pressure
let: $Z_f = (dB + C_f)/10$

| Band | Center Freq. (Hz) | Frequency Range (Hz) | Sample Data (dB) | $C_f$ (dB) | $Z_f$ |
|---|---|---|---|---|---|
| 1 | 63 | 44-88 | 68 | -26.2 | 4.18 |
| 2 | 125 | 89-175 | 76 | -16.1 | 5.99 |
| 3 | 250 | 176-350 | 77 | -8.6 | 6.84 |
| 4 | 500 | 351-700 | 73 | -3.2 | 6.98 |
| 5 | 1000 | 701-1400 | 70 | 0 | 7.00 |
| 6 | 2000 | 1401-2800 | 68 | +1.2 | 6.92 |
| 7 | 4000 | 2801-5600 | 71 | +1.0 | 7.20 |
| 8 | 8000 | 5601-11200 | 73 | -1.1 | 7.19 |

### Typical Sound Pressure Levels of Well Known Noises:

| | |
|---|---|
| Jet Airplane, 150 feet away | 140 dB(A) |
| Painful | 130 dB(A) |
| Very Uncomfortable | 120 dB(A) |
| Circular Saw | 110 dB(A) |
| Nightclub | 100 dB(A) |
| Semi Truck | 90 dB(A) |
| Sidewalk of a Busy Road | 80 dB(A) |
| Household Vacuum, 3 feet away | 70 dB(A) |
| Normal Conversation | 60 dB(A) |
| Inside Average Home | 50 dB(A) |
| Quiet Library | 40 dB(A) |
| Bedroom at Night | 30 dB(A) |

**Notable Facts about Sound:**

- +/- 1 dB(A) is inaudible to the human ear
- Decreasing a noise source by 10 dB(A) sounds half as loud to the human ear

**Example calculation of the dB(A) formula using the Sample Data above.**

$dB(A) = 10 \log_{10} \sum 10^{(Z_1)} + 10^{(Z_2)} + 10^{(Z_3)} + 10^{(Z_4)} + 10^{(Z_5)} + 10^{(Z_6)} + 10^{(Z_7)} + 10^{(Z_8)}$

$= 10 \log_{10} (67114245.2) = 78.3$ dB(A)

## Specifying Sound – A Performance Specification

**Specify sound pressure in dB(A) measured 5 feet above the fan discharge during full speed operation.**

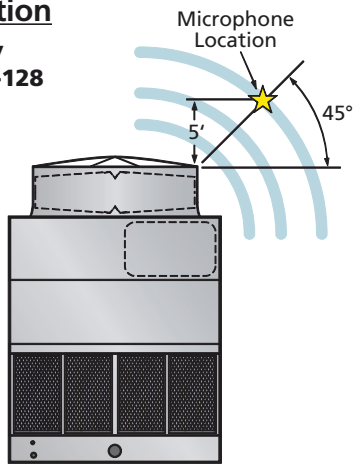
- All manufacturers can meet a performance specification with Low Sound Options
- Fan noise is what matters. 5 feet above the fan is where it matters.

### Measurement Location

**Per Cooling Technology Institute Standard ATC-128**

Sound Microphone location 5 feet above the cooling tower fan cowl edge at a 45° angle.

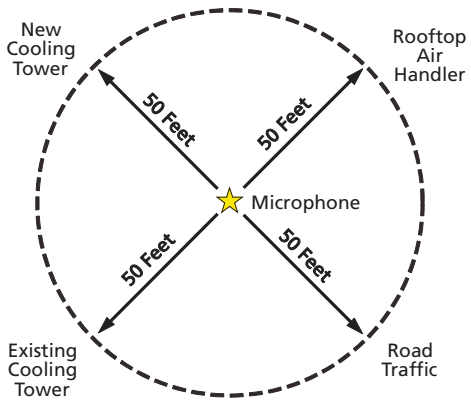
This position assures accurate sound measurements by eliminating a source of uncertainty by taking the microphone out of the high velocity fan discharge air.




### Easy Verification

At 5 feet from the cooling tower, a sound meter records only cooling tower noise. Interested parties can easily verify the actual noise coming from the cooling tower against the specified sound data with good certainty.

If sound were specified at 50 feet or some greater distance from the sound sensitive location, there is increased uncertainty in the measured data due to other possible sound sources within the 50 foot radius of the sound microphone.




### Sound Quality

Sound coming from the top of the cooling tower is comprised of low- and mid-frequency fan noise. Low- and mid-frequency fan "rumble" is very difficult to attenuate. Fan rumble travels through everything and around everything and is what is audible at any sound sensitive location.

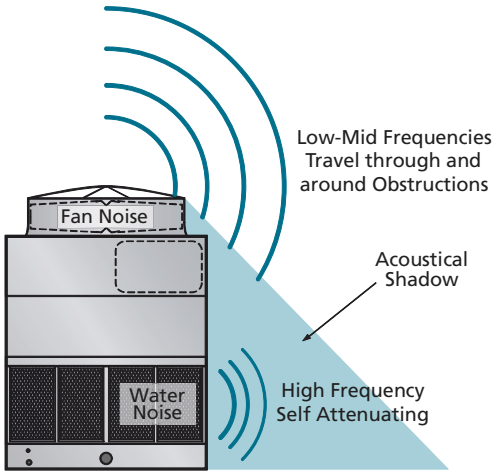
Sound coming from the sides of the cooling tower is comprised of high frequency water noise, is much less objectionable than fan noise and attenuates naturally with distance.

### Acoustical Shadow*

"Subjective reactions to the overall noise generated by cooling towers indicate that as one walks away from a tower intake, a point is reached where the water noise is masked by the fan noise. The point coincides with the point at which one emerges from the acoustical shadow of the tower structure, which shields intake water noise from discharge fan noise."

*Seelbach & Oran, "What To Do About Cooling Tower Noise", Industrial Acoustics Company.

Sound measured at the side of a cooling tower is inside the acoustical shadow of the noise emitted from the top. Outside the acoustical shadow, the low- and mid-frequency fan noise completely masks the high frequency water noise.




***Specify fan noise because it matters!***
***Specify fan noise where it matters!***

# ULTRA SST

## A 100% CORROSION-RESISTANT DESIGN
## COMPLETE STAINLESS STEEL CONSTRUCTION

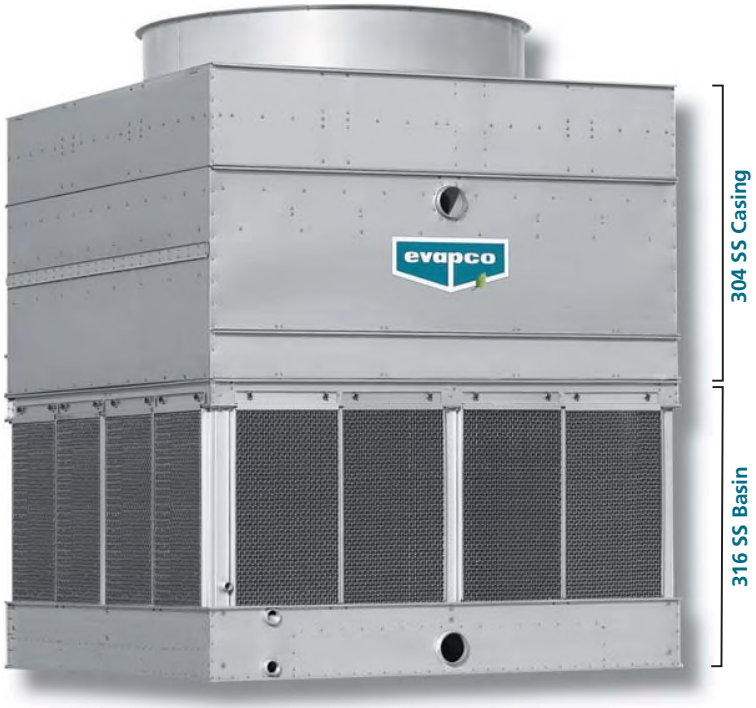
**EVAPCO, Inc.**, continues to set the standard in the cooling tower industry with the **Ultra-SST**. The **Ultra-SST** is the finest factory assembled cooling tower ever offered. It is the *ONLY* ALL Stainless Steel cooling tower offered with a Type 316 SS basin AS STANDARD! Constructed of the highest quality materials, the **Ultra-SST** provides the Ultimate in corrosion protection.

The **Ultra-SST** is a 100% corrosion-resistant cooling tower constructed of stainless steel. The premium components include:

***Type 316 Stainless Steel***
- Cold water basin
- Vertical support columns
- Air inlet louver frames
- Plenum

***Type 304 Stainless Steel***
- Upper casing and structure
- Mechanical equipment support
- Fan Cowl and Fan Guard

***PVC***
- EVAPAK® Fill
- Water distribution system
- Patented Air inlet louvers
- Patented Drift eliminators




A 100% CORROSION-RESISTANT TOWER

***Complete 316 SS Construction Available***

For a small price addition, the **Ultra-SST** can be upgraded to complete Type 316 SS construction.

***The same easy maintenance highly efficient design as an AT tower with even more durable construction.***

† CTI CERTIFIED

***CTI Certified-Standard 201***
- Independent Certification.
- No costly field performance tests required.

EVAPCO offers the **Ultra-SST** cooling tower with a standard Type 316 stainless steel cold water basin. Since the cold water basin provides the structural support for the unit and is the area most susceptible to corrosion, it is constructed with the highest quality materials. The **Ultra-SST** is the **ONLY** cooling tower in the industry that offers this protection as standard.

EXCLUSIVE 5 Year PRODUCT WARRANTY

***Exclusive 5 Year Complete Product Warranty***
- Covers the complete drive system, including the motor, on belt or gear drive units.
- Covers the complete cooling tower from the cold water basin to the fan discharge screen.
- Standard on all Ultra-SST Models.

† Mark owned by the Cooling Technology Institute

# AT/UT/USS

## ENGINEERING DATA & DIMENSIONS



## Design

EVAPCO Cooling towers are of heavy-duty construction and designed for long trouble-free operation. Proper equipment selection, installation and maintenance are necessary to ensure full unit performance while maximizing the equipment's service life. Some of the major considerations in the application of a tower are presented below. For additional information, please contact the factory.

### Piping

Cooling tower piping should be designed and installed in accordance with generally accepted engineering practices. All piping should be anchored by properly designed hangers and supports with allowance made for possible expansion and contraction. No external loads should be placed upon cooling tower connections, nor should any of the piping supports be anchored to the unit framework.

The piping connection locations shown on the drawings included in this catalog and on the website are standard locations that can be changed. If the piping connection locations shown do not meet the needs of a particular project, contact the factory to determine a viable solution.

### Air Circulation

In reviewing the system design and unit location, it is important that enough fresh air is provided to enable proper unit performance. The best location is on an unobstructed roof top or at ground level away from walls and other barriers. Care must be taken when locating towers in wells or enclosures or next to high walls. The potential for recirculation of the hot, moist discharge air back into the fan intake exists. Recirculation raises the wetbulb temperature of the entering air, causing the leaving water temperature to rise above the design conditions. For these cases, the overall unit height should be raised so it is even with the adjacent wall, reducing the chance of recirculation. This can be done by raising the entire unit or adding a discharge hood. For additional information, see the EVAPCO Equipment Layout Manual. Engineering Assistance is also available from the factory to identify potential recirculation problems and recommend solutions, such as re-orienting multi-cell units.

### Design Flexibility and Assistance

The large number of EVAPCO AT Cooling towers makes it easy to find a model to meet your design and layout needs. If there is an application for which the standard catalog product line does not work, EVAPCO will make a cooling tower that will fit your requirement. Consult your local EVAPCO Representative or the factory for assistance with Applications, Layout, Accessories or other design needs.

## Water Treatment

Proper water treatment is an essential part of the maintenance required for all evaporative cooling equipment. A well designed and consistently implemented water treatment program will help to ensure efficient system operation while maximizing the equipment's service life. A qualified water treatment company should design a site specific water treatment protocol based on equipment (including all metallurgies in the cooling system), location, makeup water quality and usage.

Without proper water treatment, the equipment can be susceptible to scale build-up on its heat exchange surfaces, biological growth in the recirculating water and corrosion of its components. Your site specific water treatment protocol should include procedures for routine operation, startup after a shut-down period, and system lay-up, if applicable.

### Passivation Period

If the equipment includes any galvanized components, the initial commissioning and passivation period is a critical time for maximizing the service life of galvanized equipment. Evapco recommends that a site specific water treatment protocol which includes a passivation procedure that details the desired water chemistry and visual inspections during the first six to twelve weeks of operation be used. During this passivation period, recirculating water pH should be maintained above 7.0 and below 8.0 at all times.

### Recirculating Water System

The cooling in a tower is accomplished by the evaporation of a portion of the recirculated spray water. As this water evaporates, it leaves behind mineral content and impurities. Therefore, it is important to bleed-off an amount of water proportional to that which is evaporated to prevent the buildup of impurities. If this is not done, the mineral content and/or the corrosive nature of the water will continue to increase. This can ultimately result in heavy scaling or a corrosive condition.

### Bleed-off

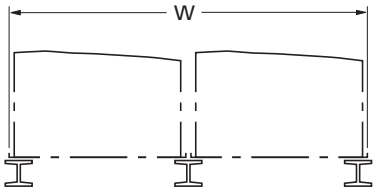
Evaporative cooling equipment requires a bleed or blow-down line to remove concentrated water from the system. The mineral concentration is monitored by measuring the conductivity of the water. Evapco recommends an automated conductivity controller to maximize the water efficiency of your system. Based on recommendations from your water treatment supplier, the conductivity controller should open and close a bleed valve to maintain the conductivity of the recirculating water.

### Control of Biological Contaminants

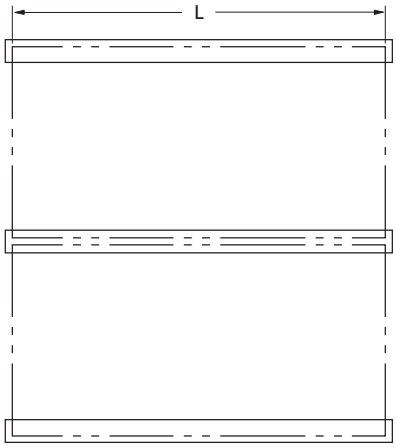
Evaporative cooling equipment should be inspected regularly to ensure good microbiological control. Inspections should include both monitoring of microbial populations via culturing techniques and visual inspections for evidence of biofouling. Poor microbiological control can result in loss of heat transfer efficiency, increase corrosion potential, and increase the risk of pathogens such as those that can cause risk to health. If excessive microbiological contamination is detected, a more aggressive mechanical cleaning and/or water treatment program should be undertaken.

# Models AT/UT/USS 212-59 to 428-952

## Suggested Three I-Beam Arrangement




End Elevation




Plan View

**Models AT/UT/USS 212-59 through 428-952**

Three I-Beams Required (By Others)

| | Dimensions | | |
|---|---|---|---|
| | Model No. | W | L |
| 2-CELL | 212-59 to 212-99 | 12′ 4-7/8″ | 8′ 5-1/2″ |
| | 215-29 to 215-99 | 15′ 4-7/8″ | 8′ 5-1/2″ |
| | 217-59 to 217-99 | 17′ 4-1/8″ | 8′ 11-1/2″ |
| | 217-111 to 217-911 | 17′ 4-1/8″ | 10′ 5-1/2″ |
| | 217-412 to 217-912 | 17′ 4-1/8″ | 11′ 11-3/4″ |
| | 217-214 to 217-914 | 17′ 4-1/8″ | 13′ 11-3/4″ |
| | 220-112 to 220-912 | 20′ 0-5/8″ | 11′ 11-3/4″ |
| | 220-118 to 220-918 | 20′ 0-5/8″ | 18′ 0″ |
| | 224-018 to 224-918 | 24′ 1-1/8″ | 18′ 0″ |
| | 224-720 to 224-920 | 24′ 1-1/8″ | 20′ 0″ |
| | 228-0124 to 228-1024 | 28′ 3-5/8″ | 23′ 9″ |
| | 228-526 to 228-926 | 28′ 3-5/8″ | 25′ 8-7/8″ |
| 4-CELL | 420-124 to 420-924 | 20′ 0-5/8″ | 24′ 1-3/4″ |
| | 420-136 to 420-936 | 20′ 0-5/8″ | 36′ 2-1/4″ |
| | 424-024 to424-924 | 24′ 1-1/8″ | 24′ 1-3/4″ |
| | 424-028 to 424-928 | 24′ 1-1/8″ | 28′ 1-3/4″ |
| | 424-036 to 424-936 | 24′ 1-1/8″ | 36′ 2-1/4″ |
| | 428-0148 to 428-1348 | 28′ 3-5/8″ | 51′ 1″ |
| | 428-552 to 428-952 | 28′ 3-5/8″ | 55′ 0-3/4″ |

**Notes:**

Models Listed Above.

1. These are suggested arrangements for preliminary layout purposes. Consult your EVAPCO representative for factory certified steel support drawings.
2. The recommended support for the AT/UT/USS Cooling Tower is structural I-beams located under the outer flanges and running the entire length of the unit. The unit should be elevated to allow access underneath the unit and to the roof below. Mounting holes, 3/4″ in diameter are located in the bottom flanges of the pan to provide for bolting to the structural steel.
3. Beams should be sized in accordance with accepted structural practices. Maximum deflection of beam under unit to be 1/360 of the unit length, not to exceed 1/2″.
4. For these models only where three support beams are required, deflection may be calculated using 56% of the operating weight on the CENTER BEAM and 22% on each OUTBOARD beam.
5. Beams should be level before setting the unit in place. Do not level the unit by shimming between it and the I-beams.
6. Support beams and Anchor bolts are to be furnished by others.
7. Dimensions, weights and data are subject to change without notice. Refer to the factory certified drawings for exact dimensions.
8. For alternate layout arrangements please consult the factory. *NOTE: OPTIONAL BOTTOM CONNECTIONS WILL REQUIRE THE UNIT TO BE ELEVATED TO ALLOW FOR PIPING.*

# EVAPCO PRODUCTS ARE MANUFACTURED WORLDWIDE.

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