ADVANCED COOLING TECHNOLOGIES, INC.

ENGINEERED AIR SOLUTIONS

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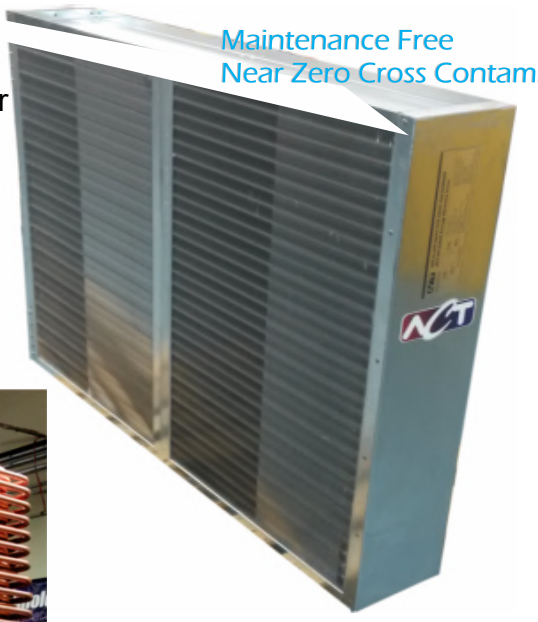
ACT Innovations in Action

Energy Recovery Systems

ACT-HP-AAHX Series Passive Air-to-Air Heat Pipe Heat Exchangers

ACT-WP-WAXH Wrap-Around
Dehumidification Heat Pipe Heat Exchanger

Maintenance Free
Near Zero Cross Contamination



20-YEAR HEAT PIPE PERFORMANCE WARRANTY

Start Saving Energy Today

- Substantial energy cost savings in cold or hot climates
- No cross-contamination between isolated airstreams
- Economically improves indoor air quality
- Quick return on investment from energy savings
- Reduce heating or cooling requirements
- Totally passive, no moving parts or system maintenance
- Engineered efficient & compact design

Application & Specification Guide

ACT Energy Recovery Systems

ACT Controllable (TILTING) Air-to-Air Heat Pipe Heat Exchanger System

The ACT-HP-AAHX recovers the energy from the conditioned exhaust airstream and transfers the energy to the supply airstream to reduce heating or cooling plant loads. The captured BTUs can save thousands of dollars per year in heating and cooling costs. Payback on larger units, 10,000 cfm and up, is typically under one year. The optional ACT-HP-AAHX-T features an integrated pivot that allows the unit to shift from summer favorable tilt to a winter favorable tilt so that energy can be recovered year round. Winter time frost protection on the exhaust stream coil can be accommodated through the building automation control system. As frost potential temperatures are reached the system briefly tilts to warm up the exhaust stream coil.

Highly reliable tilting actuators provide year round energy recovery

Depending upon airflow and regional location, ASHRAE 90.1, 2010 (Table 1) highlights applicable system CFM sizes where the ACT-HP-AAHX product is most beneficial. These recommendations are also followed by local building codes.

ACT Web-Based Selection Tool For Air-to Air Heat Pipe Heat Exchangers

No Registration Required

Selecting ACT-HP-AAHX System:

This ACT-HP-AAHX Selection tool www.1-ACT.com/HVAC/AAHX, is intended to provide the HVAC designer with the capability to perform a system design selection and to evaluate energy recover performance at various design points. It is also intended as a system design collaboration tool to clearly communicate project requirements, goals, and preliminary selections with ACT applications engineers.

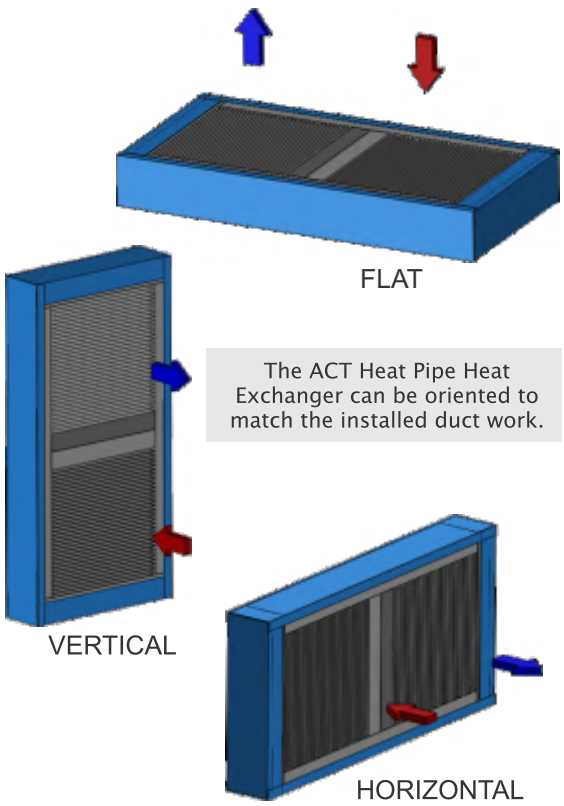
Documenting and Evaluating Your Work:

There are two useful output options. One is a "Print to PDF", which will capture the on screen data in a PDF format. The other is a "Submit to ACT" which again captures the screen data, including your optional project information. The PDF arrives at ACT where it can be evaluated and potential recommendations can be made for system design optimization. The final selection can be the basis for a quotation.

Optimize Your Dedicated Outdoor Air Installations

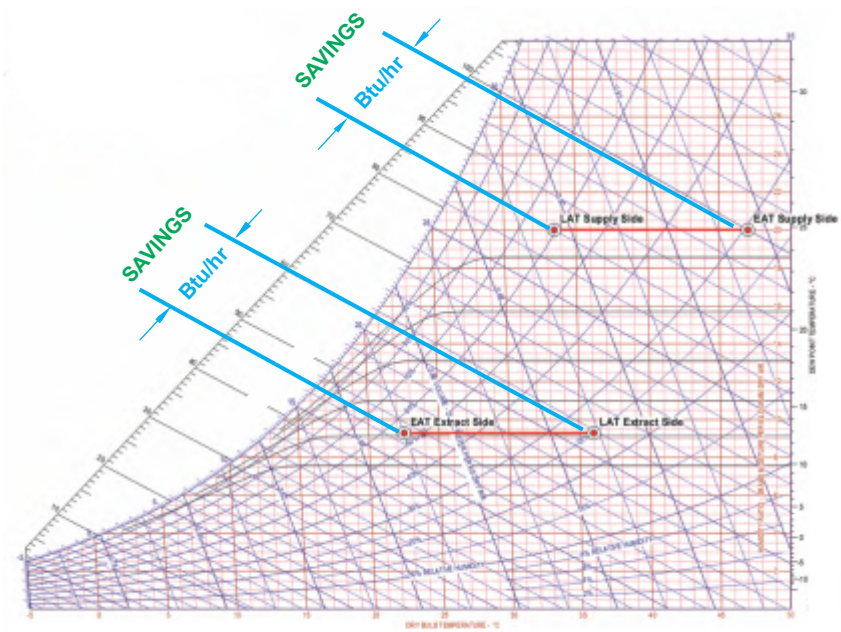
- **Reduce Overall HVAC System Heating and Cooling Requirements:** Size of the heating and/or cooling systems can be downsized based on our Air-to-Air heat pipe heat exchanger performance efficiency. The energy used to heat or cool air leaving a facility can now be safely recovered and passively transferred to boost HVAC system performance.
- **Meet Standards & Codes:** ACT's Heat Pipe Heat Exchangers enable HVAC system designers to meet ASHRAE Standards 62.1 and 90.1, increasing building comfort while saving the building owner thousands of dollars per year.
- **Easily Specified:** ACT-HP-AAHX Series Heat Pipe Heat Exchangers feature a thin planar profile construction. The slim profile provides ease of installation in new or existing AHU equipment, industrial or commercial energy recovery applications. Multiple, individually sealed high capacity heat pipes offer reliable lifetime performance. Each installation is sized for optimum performance for the highest practical Btu/hr transfer between air streams.
- **Care and Operational Costs:** Since our Energy Recovery systems are totally passive (zero external electrical power to operate), your energy saving add up year after year. There are no periodic maintenance requirements needed for typical operating conditions other than keeping the heat pipe coils free of dust and debris.

Air-to-Air Heat Pipe Heat Exchanger Installation Options:



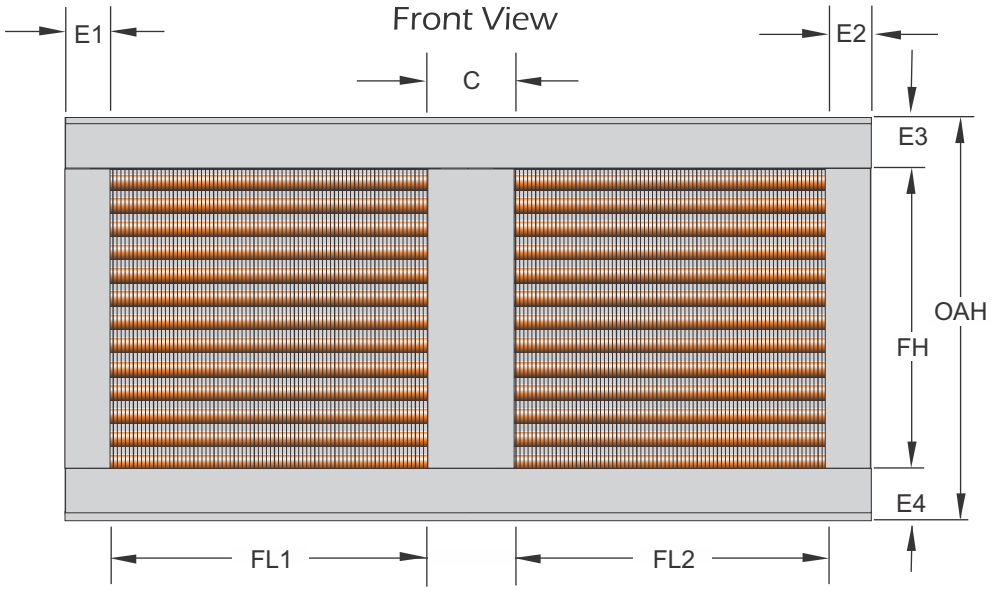
The ACT Heat Pipe Heat Exchanger can be oriented to match the installed duct work.

Air-to-Air Heat Pipe Heat Exchanger System Sensible Heat Transfer Performance



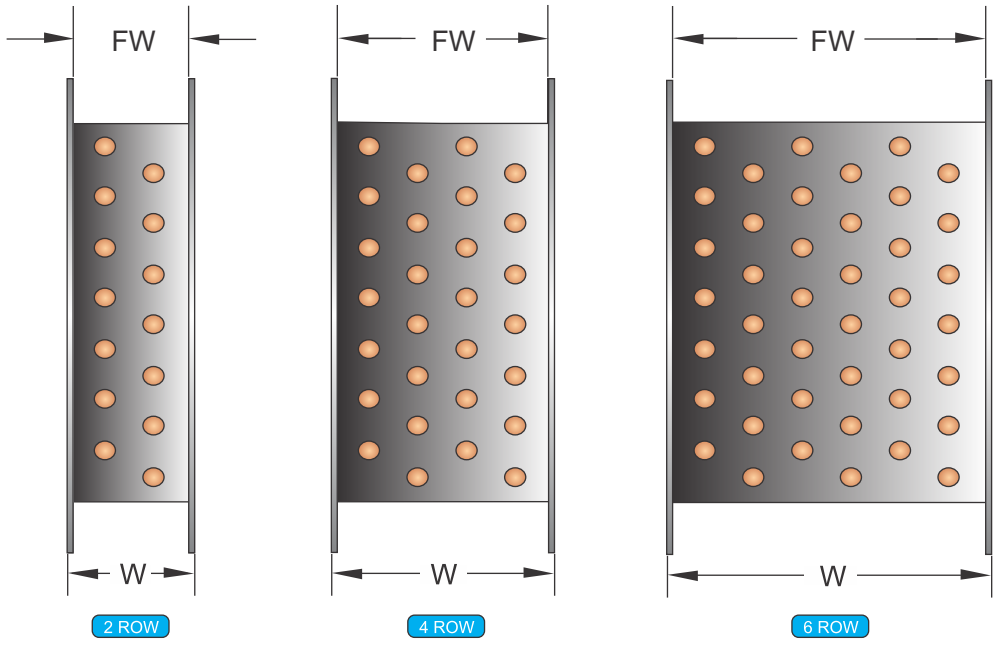
Every ACT Air-to-Air Heat Pipe Heat Exchanger is designed to yield the optimal effectiveness in BTU/hr savings. ACT's energy recovery systems are custom engineered for each project to yield the best ratio of cost versus performance. Typical system payback is in under two years.

Air-to-Air Heat Pipe Heat Exchanger Dimensional Specifications



Front View Dimension Table	
Fin Height "MUST" be in multiples of 0.625"	FH: Fin Height
User Specified	FL1: Fin Length
User Specified	FL2: Fin Length
Typically 2.0" or as specified	C: Center Divider Width
Minimum of 1.5" or as specified	E1 - E2: Side Flange
Minimum of 1.0" or as specified	E3 - E4: Top - Bottom Flange

Side View 2 - 4 - 6 Row Heat Pipe Heat Exchangers

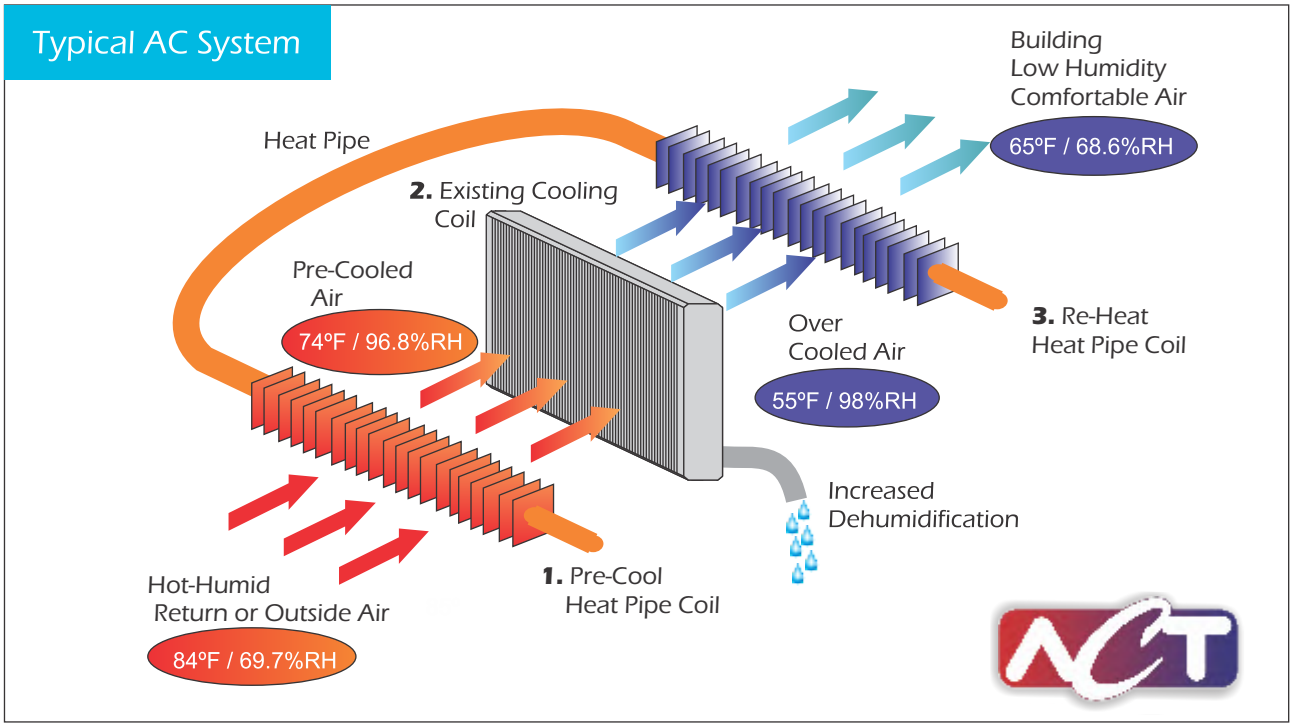


Side View Dimension Table by Number of Rows										
Rows	1	2	3	4	5	6	7	8	9	10
W*	1.5"	3.0"	4.0"	5.0"	6.0"	7.0"	8.0"	9.25"	10.5"	11.5"
FW	1.08"	2.17"	3.25"	4.33"	5.42"	6.49"	7.58"	8.66"	9.75"	10.83"

Note: W Indicates Minimum Width other Widths can be specified.*

ACT Energy Recovery Systems

ACT-HP-WAHX Wrap-Around Heat Pipe System Basics



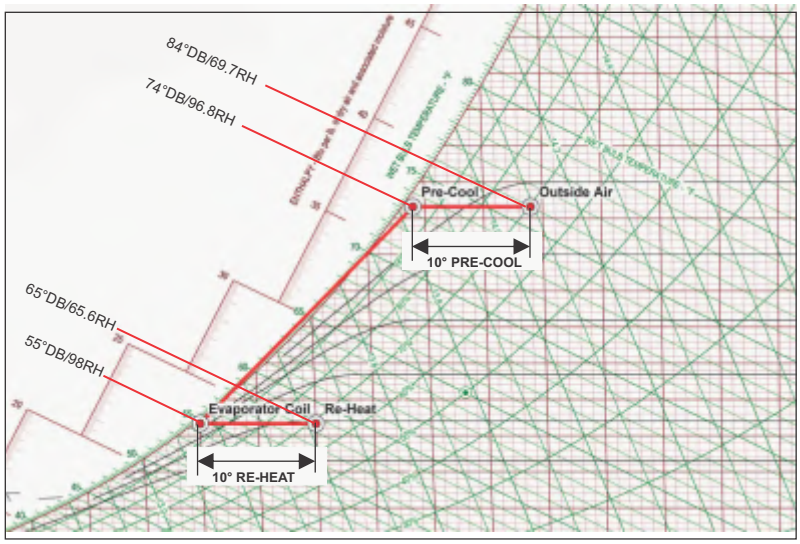
Wrap-Around System Enhanced Dehumidification Function

The ACT-HP-WAHX HVAC heat pipe system performs two major beneficial functions: Increased levels of dehumidification and reduced energy costs.

Application Example:

Step 1. Incoming return or outside air at 84ºFDB/69.7%RH is pre-cooled to 74ºFDB/ 96.8%RH by the pre-cool heat pipe coil.

Step 2. The pre-cooled air flows through the DX or chilled water cooling coil exiting at 55ºFDB / 98%RH . By adding a pre-cool heat pipe coil, the system now functions more efficiently and can perform higher levels of latent cooling and increased dehumidification. Often times a smaller capacity AC system can be chosen due to the increased cooling performance from the pre-cool coil.



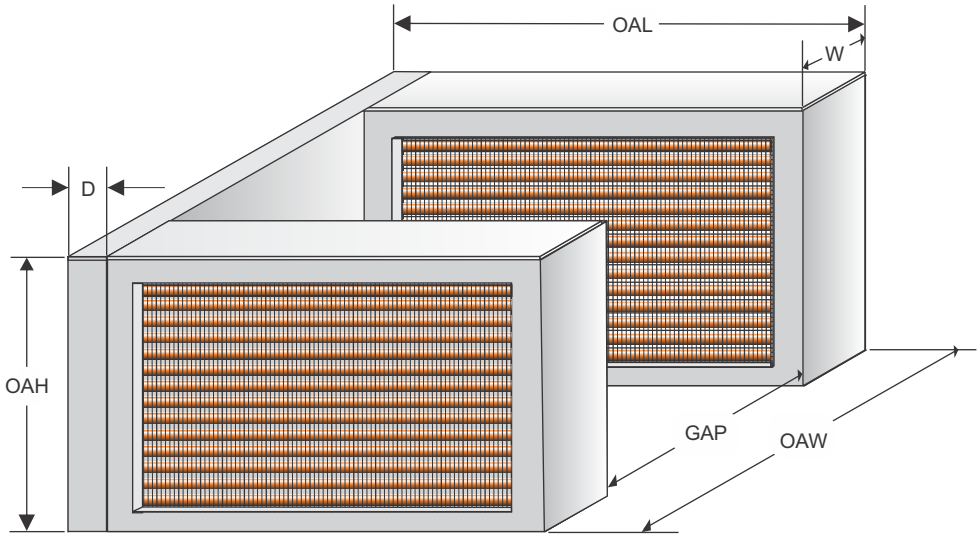
Psychrometric chart illustrates the HVAC benefits of a ACT-HP-WAHX System

Step 3. The air leaving the active cooling coil is often in an over cooled state and requires re-heat. For this example, the re-heat heat pipe coil is sized to bring the building supply air to a more comfortable range of 65ºFDB / 68.6%RH. ASHRAE standards describe many instances for the requirement of humidity control . Since the building air now has low levels of humidity and more comfort, thermostat temperatures can be set higher, saving even more energy.

The addition of the ACT-HP-WAHX Wrap-Around System can effectively increase the dehumidification performance of any HVAC system. Thousands of dollars can be saved by eliminating the need for electricity or gas to reheat the supply air.

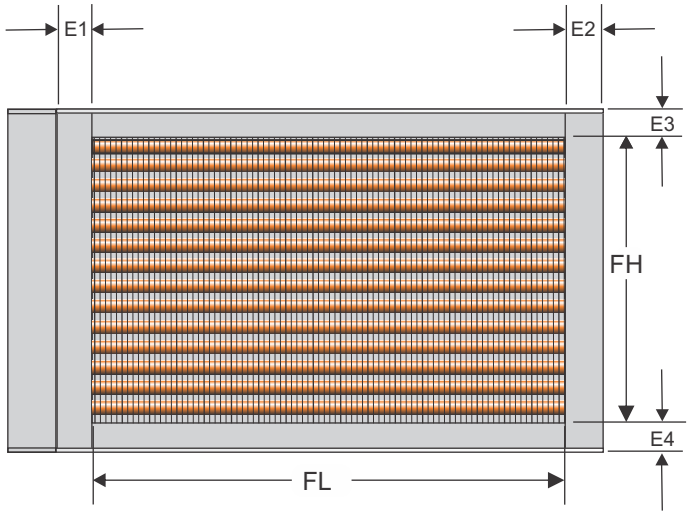
ACT-HP-WAHX Engineering Dimensions

Energy Recovery Overall System Dimensions



Dimension Table	
OAH: Total Height	User Specified
OAL: Total Length	User Specified
OAW: Total Coil Spacing	User Specified
GAP	User Specified
FH: Fin Height	Fin Height "MUST" be in multiples of 0.625"
FL: Fin Length	User Specified
E1 - E2: Side Flange	Minimum of 1.5" or as specified
E3 - E4: Top - Bottom Flange	Minimum of 1.0" or as specified
D: Return Tube Depth	See table for minimum or as specified
W: Coil Width	See table for minimum or as specified

Energy Recovery Coil Side View



(D) Return Tube Depth Table by Number of Rows										
Rows	1	2	3	4	5	6	7	8	9	10
D	2.0"	2.0"	2.75"	2.75"	3.5"	3.5"	4.25"	4.25"	5.0"	5.0"

(W) Coil Width Table by Number of Rows										
Rows	1	2	3	4	5	6	7	8	9	10
W*	1.5"	3.0"	4.0"	5.0"	6.0"	7.0"	8.0"	9.25"	10.5"	11.5"

Note: W Indicates minimum width other widths can be specified.*

ACT Heat Pipe Heat Exchanger Coil Protection Coating Options

ElectroFin® E-Coat was designed to protect HVAC&R coils from corrosive environments and is a market-leading product, used by nearly every major OEM. E-Coat is highly flexible, non-brittle and scratch resistant.

Heresite is a baked phenolic coating, generally dark brown in color. Heresite is resistant to many chemicals. It is also widely specified worldwide .

Note: All standard industry coatings are available.