Innovations in Action

ADVANCED COOLING TECHNOLOGIES, INC.

ENERGY RECOVERY SYSTEMS

ACT-HP HVAC SYSTEMS

START SAVING ENERGY TODAY:

- Energy cost savings over 40%
- Quick return on investment from energy savings
- Enhanced dehumidification/latent cooling performance
- Totally passive, no moving parts or system maintenance
- Eliminates active overcooling and reheating for dehumidification
- Engineered efficient & compact design
- No cross-contamination between airstreams

US DEPARTMENT OF ENERGY CITES HEAT PIPES AS... "UNDER UTILIZED"[1] AND A VIABLE ENERGY SAVING TECHNOLOGY FOR HVAC SYSTEMS.

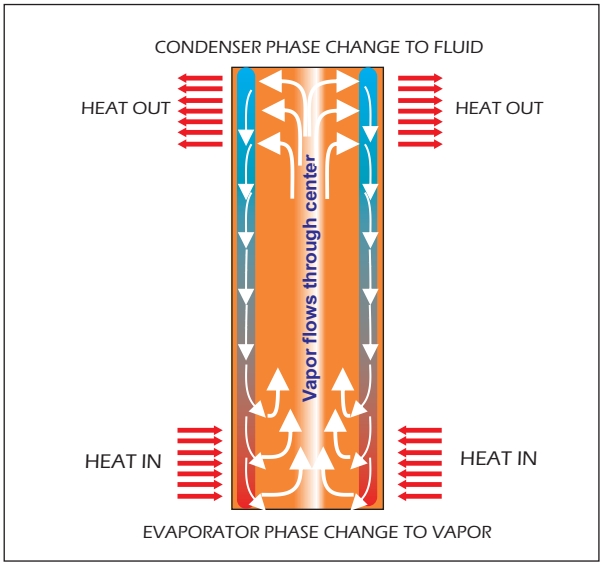
ACT Energy Recovery Systems

ACT-HP HVAC Dehumidification Technology

Our ACT-HP-WA dehumidification systems utilize the passive "Zero-Energy" consuming heat pipe technology. Heat pipes are a proven heat transfer technology with highly dependable operational performance in diverse applications including HVAC, industrial electronics, military and aerospace. Advanced Cooling Technologies, Inc. (ACT) has over 100 years of accumulated engineering experiences in the design, testing and manufacturing of heat pipes. Our Zero-Energy heat pipe technology can be retro-fitted on site or designed into new systems at the factory. HVAC systems ranging from 400 to100,000 cfm can take advantage of our wrap-around dehumidification system. Payback can be calculated with return on investment on average in under two years. In most cases, HVAC systems can be downsized due to enhanced dehumidification/latent cooling performance.

ACT-HP HVAC Dehumidification Technology

Thousand Times Better Conductor Than Copper



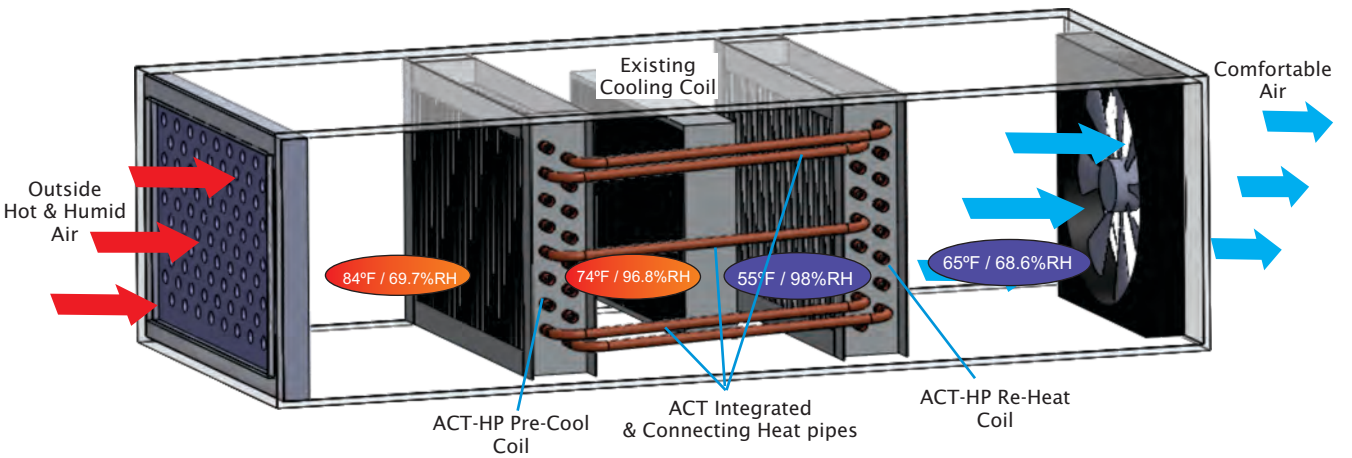
Heat Pipe Operating Principle:

Heat pipes function by absorbing heat at the evaporator end of the cylinder, boiling and converting the fluid to vapor. The vapor travels to the condenser end and condenses to liquid, the condensed liquid flows back to the evaporator, aided by gravity.

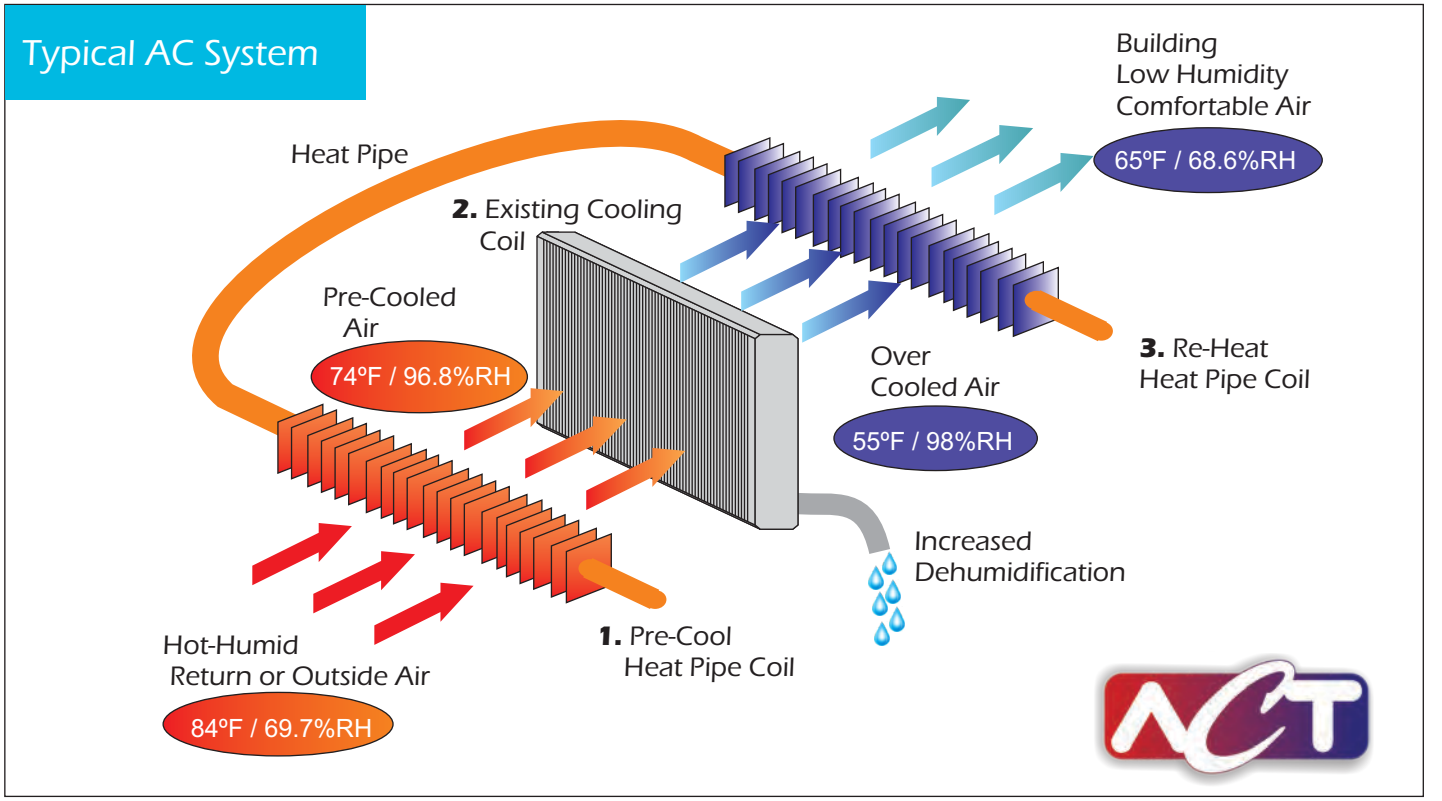
This phase change cycle continues as long as there is heat (warm outside air) at the evaporator end of the heat pipe. This process occurs passively (no external electrical energy required). A typical ACT-HP-WA HVAC System moves thousands of Watts of heat from warm outside air to the chilled dry air.

ACT-HP-WA Wrap-Around System Overview: *Can Be Retrofit or Factory Installed*

Shown is a typical ACT-HP-WA Wrap-Around dehumidification system. The Wrap-Around system has three basic components made of a pre-cool coil, re-heat coil, and heat pipes connecting the coils. The Wrap-Around system, in most cases, does not require major duct rerouting, and can be installed by a contractor. Larger systems require on site installation by an ACT factory technician. Typical retrofits utilize existing space and offer immediate savings through reduced electrical or gas reheat energy costs.



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



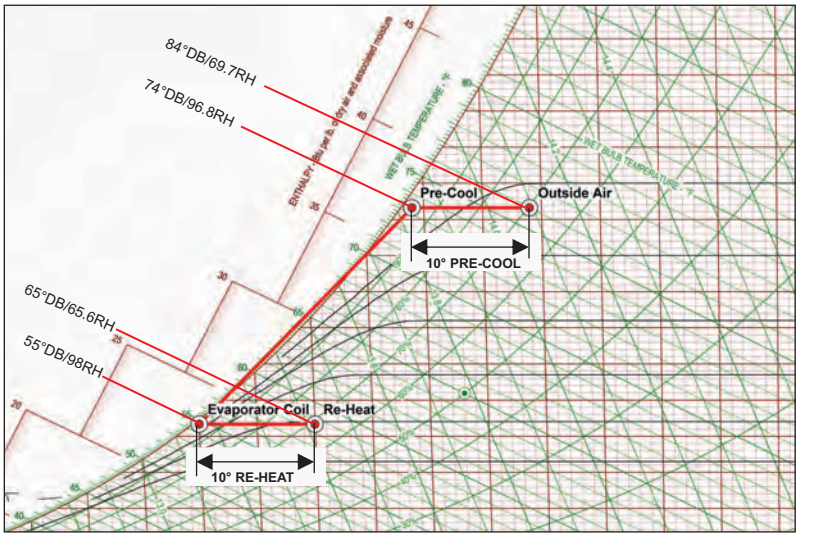
Wrap-Around System Enhanced Dehumidification Function

Our ACT-HP-WA 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 84ºF air is pre-cooled to 74ºFDB/ 96.8%RH by the pre-cool heat pipe coil.

Step 2. The pre-cooled air flows through the existing AC evaporator cooling coil 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.



Psychometric chart illustrates the HVAC benefits of a ACT-HP-WA System

Step 3. The air leaving the existing AC evaporator coil is in an over cooled state and requires re-heat. The re-heat heat pipe coil is sized to bring the entering building 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-WA Wrap-Around System can effectively increase the dehumidification performance of any HVAC system. In addition, there can be thousands of dollars saved on electricity or gas required for reheating the over cooled air.

Products:

ACT-HP-WA Wrap-Around Dehumidification Systems offer engineered performance to enhance your systems efficiency and greatly reduce operating costs. ACT-HP-WA Wrap-Around systems can be designed for all major AHU manufactures. For retrofitting existing systems, ACT can ship a pre-engineered unit-fully charged and ready to simply slide in place. Or, we can install the system on-site or at our factory. Typical design build/install costs are recouped in a 1-2 year payback period.

ACT-HP-ERS Energy Recovery Heat Exchanger Systems

ACT-HP-ERS Heat Exchanger/Energy Recovery Systems feature our high performance, high reliability heat pipes. Save energy by pre-cooling or pre-heating your incoming building supply air. ACT-HP-ERS Heat Exchangers can be fitted to your exiting HVAC system. Our designs are sealed to prevent cross contamination of airstreams. Systems qualify for LEED or High Performance Building points.

General Specification:

- Heat Pipe Material:	Copper
- Fins	Copper or Aluminum
- Protective Coating:	Specified by application
	Heresite, E-Coat, Iridite, Tin plate
	Hot Dip Galvanized, Nickel plate
- System Working Fluid:	R-134a
- Operating Temperatures:	Specified by design

Heat Pipes Systems Provide Benefits to help meet or Achieve:

- ASHRAE Standard 62.1- 2007 Ventilation for Acceptable Indoor air Quality
- ASHRAE Standard 90.1 2010 Energy Standard for Buildings Except Low Rise Residential Buildings
- ASHRAE 189.1 Standard for the Design of High-Performance green Buildings
- Energy Policy Act 2005: Green Building Performance
- LEED Points possible for; Energy and Atmosphere, Indoor Environmental Air Quality, Innovation in design
- ISO 5000: Energy Management Standard: public and private sector organizations with management strategies to increase energy efficiency, reduce costs and improve energy performance.

Note: USDOE REFERERENCE [1]: www1.eere.energy.gov/femp/technologies/eut_wraparound_pipes.html

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Represented By: