

## Energy Recovery Heat Pipes

# ENGINEERING SPECIFICATIONS

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### 1. GENERAL

Air-to-Air Energy Recovery Heat Pipes to be supplied by HPT to exchange heat/cooling between two air streams for heat or cooling recovery. The heat pipes shall be inside and integral to the equipment cabinet or located in the ductwork. In either case, drain pans are required and to be provided by others. Heat Pipe circuits comprise multiple tubes connected in series, end-to-end. The heat pipe circuits shall be:

- Level to attain equal amounts of heat and cooling recovery (HRM-H™);
- Optimized for greater recovery in heating mode with appreciable recovery in cooling mode (HRM-Z™ for heating);
- Optimized for greater recovery in cooling mode with appreciable recovery in heating mode (HRM-Z™ for cooling);
- Vertical in over/under configuration to attain maximum recovery in one mode only (HRM-O™).

Energy recovery heat pipes shall be tested and certified to AHRI standard 1060. Performance printouts as well as the product itself to carry AHRI 1060 compliance logo. Documents showing testing in accordance with AHRI 1060, but not certified by AHRI, will not be acceptable. Tests shall also show zero EATR (Exhaust Air Transfer Ratio) from exhaust to supply air.

Any deviation from the specifications must be approved by the engineer no less than ten days prior to the project bid date. No consideration of alternates will be given after that time. Heat pipes shall be completely manufactured and fully assembled at the manufacturer's facility by factory personnel. Conversion of third party coils is not acceptable.

### 2. HEAT PIPES

- 1) The Heat Pipe supplier shall have a minimum of 5 years of experience designing and installing Heat Pipes specifically for energy recovery applications.
- 2) The tubes shall be 1/2" OD copper, of specific design for Heat Pipe application, permanently expanded onto the fin collar to form a firm, rigid, and complete pressure contact at all operating conditions. Aluminum tubes will not be allowed. Tubes shall be no larger than 5/8" OD.
- 3) The fin surface shall be continuous plate type  aluminum  copper fins of specific design to produce maximum heat transfer effectiveness for heat pipe applications. Airside pressure loss shall be as given on the schedule or otherwise specified. Fin density and the number of rows of tubes shall be as specified.
- 4) The Heat Pipe modules shall have an optional protective coating of  E-Coat, similar to Electrofin or  phenolic, similar to Heresite. Coils shall be dipped and completely submerged to ensure full coverage of coating - spray coatings are not acceptable.
- 5) Heat transfer fluid shall be classified as Safety Group A1 in ASHRAE Standard 34-2013.

- 6) Heat pipe capacities, entering and leaving dry and wet bulb temperatures, and face velocity shall be as specified.
- 7) The frames and mounting structure shall be minimum 16 gauge  galvanized steel  stainless steel. The supply and exhaust air streams shall be isolated from each other by  a single separating partition,  a double separating partition, or  a foam-filled double separating partition. Cross contamination between the air streams is not acceptable.
- 8) Heat pipe circuitry shall be as specified by HPT design. Each circuit shall be individually processed, charged, and hermetically sealed.
- 9) Scheduled effectiveness or heat recovery shall be met at a minimum and total pressure drop shall not be exceeded. The resulting Recovery Efficiency Ratio, or RER, shall therefore be met at a minimum.
- 10) The Heat Pipes shall be ETL or UL listed to UL standard 207 and CSA standard C22.2.140.3
- 11) The Heat Pipe heat exchanger shall have a five (5) year limited warranty. All components such as valves and dampers shall carry a 12 month warranty.

### 3. OPTIONAL BYPASS DAMPER

- 1) The bypass damper shall bypass air around the supply side of the energy recovery heat pipe for freeze protection. Damper shall be of low leakage design.
- 2) Blades and frames shall be made of roll formed galvanized steel, minimum 16 gauge. Frames shall be constructed with hat shaped channels, reinforced, or with welded corners.
- 3) Axles shall be plated steel. Dampers shall be incorporated with face linkage or concealed linkage in the frame to interconnect all the blades.
- 4) The damper shall be equipped with a modulating motorized actuator package. The motor shall operate on  24 VAC  120 VAC  208 VAC  240 VAC  265 VAC  460 VAC 60 Hz. Actuator motion shall be modulated by a 2 to 10 VDC proportional output from an adjustable proportional temperature control responding to a temperature sensor in the exhaust leaving air stream. Damper motion shall be spring loaded to fail  normally closed (NC)  normally open (NO).