

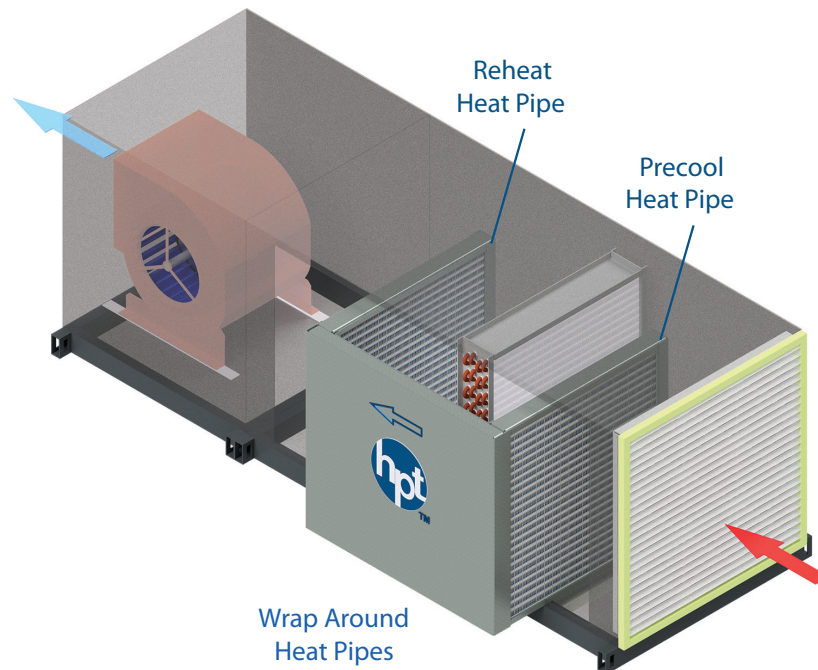
Heat Pipes in Indoor Grow Facilities

Passive Humidity Control with Huge Energy Savings

Grow facilities need to deal with varying conditions caused by day and night cycles while keeping temperature and humidity levels under control. Night conditions (lights off) present a special challenge due to the lack of sensible heat (dry heat), while moisture in the air remains more or less the same. Design engineers opt for adding either expensive standalone dehumidifiers or very costly reheat for night conditions. And, depending on how low the leaving air dew point is, reheat may be needed for day conditions as well. This reheat adds sensible heat to the space to compensate for the missing sensible load when lights are off and to raise the temperature during day cycle to meet space conditions. In doing so, cooling systems will need to run to remove moisture from the air and to maintain relative humidity levels at 50% and a dry bulb temperature of 75°F.

Since night conditions represent at least 12 hours of the daily cycle, active reheat or standalone dehumidifiers can add a significant cost to the operation. In critical applications like these, where reheat is used, wrap-around heat pipes can help reduce the cost of cooling (up to 25% cooling equipment downsizing and the same in operational cost throughout the life of the equipment). Most, if not all needed reheat is also saved, thus generating significant energy savings year-round. Controllable heat pipes need to be considered if the process requires reheat turned off or modulated during the day cycle, and turned on during the night cycle to provide needed reheat.

Passive wrap-around heat pipes are comprised of precool heat pipes upstream of the cooling and reheat heat pipes downstream of the cooling coil (see illustration below). The precool coil lowers the air temperature reducing the load on the cooling coil, allowing possible downsizing of cooling equipment. The reheat coil then puts back the heat captured from the precool side into the airstream to reduce or eliminate the need for reheat.



Typical Layout of an Air Handler with Wrap-Around Heat Pipes

Advantages of Using Heat Pipes in Indoor Grow Facilities

- Passive Dehumidification
- Controllable: Can be turned on or off as needed
- Possible A/C load reduction
- Reduction or elimination of expensive reheat
- RELIABLE – No moving parts to fail
- Small footprint, less space taken
- Can be added to new or existing systems
- Can be fitted to air handlers of all shapes and makes
- Multiple refrigerant circuits provide added REDUNDANCY