“Hollow Fiber Ground Evaporator Unit Testing” by Grant Bue, Luis Trevino, and Gus Tsioulos

A candidate technology for 1-atmosphere suited heat rejection was developed and tested at NASA Johnson Space Center. The concept is to use a collection of microporous hydrophobic tubes potted between inlet and outlet headers with water as coolant. A pump provides flow between headers through the tubes which are subjected to fan driven cross flow of relatively dry air. The forced ventilation would sweep out the water vapor from the evaporation of the coolant rejecting heat from the coolant stream. The hollow fibers are obtained commercially (X50-215 Celgard) which are arranged in a sheet containing 5 fibers per linear inch. Two engineering development units were produced that vary the fold direction of the fiber sheets relative to the ventilation. These units were tested at inlet water temperatures ranging from 20 deg C to 30 deg C, coolant flow rates ranging from 10 to 90 kg/hr, and at three fan speeds. These results were used to size a system that could reject heat at a rate of 340 W.