

Section 01. Innovations in Engineering

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Advantages of Heat Pipe Coolers for Thermal Control of Computer Operations

Coolers of heat pipes robustly occupy their niche competing with coolers on the basis of ribbed radiators in the context of on technical characteristics.

Recent heat pipes being used to cool down computer facilities are charged with following composition: water (90 %), nitrogen impurities (0.3 %), hydrogen nitride (7 %), and aldehyd HC 7 (2.7 %).

Heat pipes have broad range of operational temperatures; speed of heat transmission is in excess of ultrasound velocity. Their operational life is more than 20000 hours making them extremely efficient and reliable engineering system. Working fluid (water) and core (several layers of thin wire or specifically sintered ceramic cuts) are inside. Air has been pumped out from heat pipes to help water boil at lower temperatures.

Heat removal in heat pipes is provided with heat-conducting medium emission within a zone of heat liberation. However, boiling heat of heat-conducting medium is hundreds times higher than specific heat of water being one of the best heat carrier operating under atmospheric pressure and at temperatures allowable to electronic equipment (30-90°C). It is almost forty times for ethylic alcohol. Thus, refrigeration capacity is proper times more.

ICE HAMMER Electronics Company has represented a new type of heat pipe based coolers developed using new Heat Transporting System (HTS) technique.

The system is in between heat pipes and liquid cooling systems. Intense mixture starts boiling when its temperature is 25 to 50°C. High content of water also operating as heat carrier is its characteristic property. Resulting gas bubbles being elevated to coolant carry water and operate as natural pump. That accelerates water circulation to compare with ordinary heat exchange through convective streams.

Application of gravitational physics to the process may help assume that its efficiency will be minimal if the pipes are located vertically.

Selection of the most effective cooler based on heat pipes involves a cooler with the great number of heat pipes having large diameter. Design of a cooler should provide direct contact of heat pipe with surface to be cooled.