10 most important rules for using heat pipes.

1.

- *Heat is absorbed in the evaporating section (hot place).*
- *Fluid boils to vapor phase.*
- *The vapor distribute uniformly the heat in the heat pipe.*
- *Heat is released from the upper part of cylinder to the environment; vapor condenses to liquid phase (cold place).*
- *Liquid returns by gravity to the lower part of cylinder (evaporating section).*

2.

Inside the heat pipe the temperature everywhere is nearly the same, even outside between hot place and cold place there is a high temperature difference.

3.

Heat pipes are components, which are able to transport heat in a very fast and efficient way from a hot place to a cold place. Because of that heat pipes sometimes are called thermal superconductor. The transported heat quantity and the transport speed of the heat can be 100 to 10,000 times of a copper bar with the same dimensions than a copper heat pipe.

4.

With heat pipes, you can realise totally equably temperature in boxes or on surfaces.

5.

The most important parameter for the efficiency of a heat pipe is the heat resistance between the hot object and the heat pipe on one side and the heat pipe and the cooling equipment or heat exchanger at the other side.

6.

This heat resistance's have to be as low as possible. So the recommendation for beginners is, to use heat pipe systems with integrated heat transfer interfaces.
High heat resistance's can never been compensated by a higher efficiency of the heat pipe.

7.

Heat pipes have to work in the defined area of temperature and of power. Otherwise the heat transfer will have a break down and will be finished completely.
Because of the start conditions (temperature level, temperature difference, heat transfer quantity, time factor, geometry) the heat pipe must have different materials, inside surfaces, diameters, lengths, fluids, fluid quantities, grades of vacuum etc. etc.. So it is difficult to standardise heat pipes.
Liquidity
Different types of heat pipes can be designed for different temperature ranges between –263°C and +5,000°C. in case of extreme low temperature the fluid has to be Natrium. In case of low temperatures hydrogen is the right fluid.
Because of the high quantity of evaporation heat, water is the most used fluid. But water can only be used at temperatures higher than 0°C.
Temperature, temperature difference
The heat transfer quantity (W) is in a relation to the working temperature (warm place) and the temperature of the cold place (defined by the heat sink or the heat exchanger).

8.

In case of Heatpipes with grooves inside, the best position of the heatpipe is vertical. The position of heatpipes with mesh must not be strictly vertical. Heatpipes with a sinter surface inside (capillary heat pipes) can work in each position from vertical to horizontal.

9.

The efficiency of the heatpipe depends to the position (vertical is the best).

10.

A to small bend radius can demolish the inside surface of the heat pipe. In special cases self bending is not allowed. Bending of heat pipes with a too small angle can reduce the efficiency or to a break down. Also there is a correlation between the angel and the allowed position of the heat pipe.