Two-phase thermal control systems for the advanced spacecraft

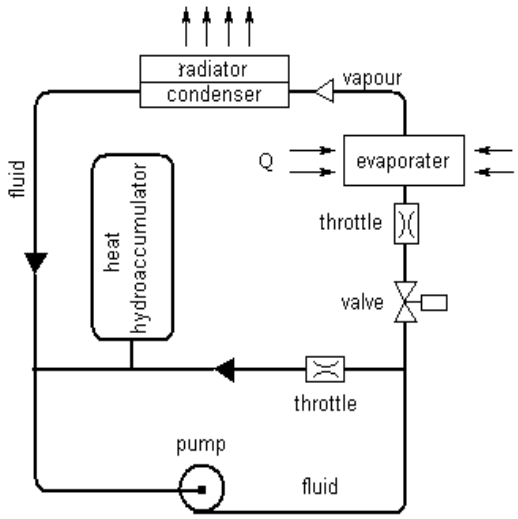
Two-phase ammonia systems of thermal control for the spacecraft with high heat release have been developed by KeRC jointly with Korolev Rocket and Space Corporation "Energia", Central Research Institute for Machine-Building, Moscow State Technical University "N. Bauman", and Kharkov Aviation Institute (the Ukraine).

These systems feature improved mass and energy efficiency.

Such systems are applicable for a number of advanced SC used for various applications – from earth remote sensing to powerful telecommunication platforms and orbital stations.

The two-phase ammonia system has been developed and tried on the test facility at KeRC and has demonstrated its serviceability in prolonged microgravity when being a part of "Mir" station.

Technology advances have been developed and practical experience has been gained, experimental and production facilities have been established for realization of such systems on the home-made and foreign spacecraft.



Heat pipes for Thermal control system of spacecrafts.

Keldysh Research Center in cooperation with Korolev Rocket and Space Corporation "Energia" has proceeded to manufacture of heat pipes of new generation with increased service life. To produce heat pipes, sections with an optimized capillary structure are used, and superhigh-purity ammonia is used as heat carrier. The technology of surface preparation, filling and pressurization of heat pipes was developed and tried out on pilot batches, it enables one to obtain long service time of heat pipe operation and excellent thermophysical indices.

Material of casing – AMg-02 or AD-31 aluminum alloys
Heat carrier – superhigh-purity ammonia
Maximum capacity – up to 500 W
Minimum capacity – down to 10 W
Temperature gradient over the length – no more than 7 K
Non-tightness – no more than 10^{-6} norm. cm^3/s
Length of zone blocked by noncondensing gas – no more than 30 mm
Service life – no less than 15 years

In compliance with the customer's work specification heat pipes can be manufactured, subjected to a full cycle of tests including accelerated life tests.