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CENTRIFUGAL DISTILLER OF WATER RECOVERY SYSTEM FOR DEEP SPACE MISSIONS

Abstract

In the interplanetary flights it is impossible to deliver water to the spacecraft from the Earth. Storing water for the astronauts for the entire flight (for months or years) is an unrealistic task at the current level of technology. Deep space missions to space (to the Moon, Mars) are impossible without a highly reliable, economical, small-scale water supply system. Thus, the reliability of the system comes to the fore, because there are no reserve options in these conditions. The paper describes and presents the experimental data of a new centrifugal flash distiller (CFD) with a heat pump (THP). At a performance of 1,5 l/h, this system has a specific energy $<$ 200 Wh/l, recovery to 98%. The heat pump has been optimized for this system. The possibility of increasing recovery due to transfer of the distillation system to the regime with the crystallization of the substances dissolved in the initial liquid has been verified. Compared to the previously developed three- and five-stage distillers (CDS), the single-stage flash evaporator (CFD) has significantly smaller dimensions, weight and, the most importantly, higher reliability due to a significant simplification of the design.