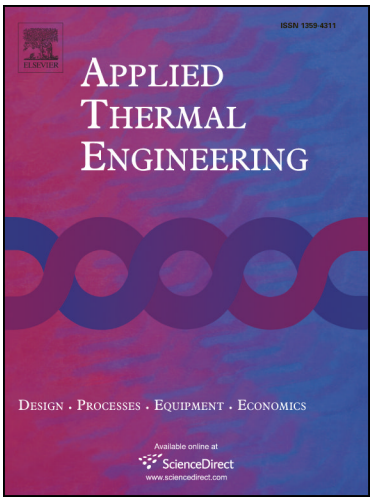


# Experimental study of an ammonia loop heat pipe with a flat disk-shaped evaporator using a bimetal wall

Yu.F. Maydanik, S.V. Vershinin, M.A. Chernysheva

PII: S1359-4311(17)32516-4
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2017.07.152
Reference: ATE 10820

To appear in: *Applied Thermal Engineering*

Received Date: 14 April 2017
Revised Date: 19 June 2017
Accepted Date: 20 July 2017

Please cite this article as: Yu.F. Maydanik, S.V. Vershinin, M.A. Chernysheva, Experimental study of an ammonia loop heat pipe with a flat disk-shaped evaporator using a bimetal wall, *Applied Thermal Engineering* (2017), doi: http://dx.doi.org/10.1016/j.applthermaleng.2017.07.152

# Experimental study of an ammonia loop heat pipe with a flat disk-shaped evaporator using a bimetal wall

Yu.F. Maydanik[1], S.V. Vershinin[1], M.A. Chernysheva[2],
Institute of Thermal Physics, Ural Branch of the Russian Academy of Sciences,
Amundsena St., 107, Yekaterinburg, 620016, Russia
Tel: (7-343) 2678-791, Fax: (7-343) 2678-791,
E-mail: [1] maidanik@etel.ru, [2] mariya@itp.uran.ru

**Abstract**

A loop heat pipe (LHP) with a flat disk-shaped evaporator 40 mm in diameter and 18 mm in thickness has been developed and tested. The device was made of stainless steel and equipped with a main nickel biporous wick and a secondary wick made of a porous material with a low thermal conductivity. The flat evaporator wall being heated was made of a "stainless steel – copper" bimetal. The working fluid was ammonia. The LHP thermal characteristics were investigated at different orientations with slopes from -90° to +90° and heat sink temperatures in the range from 0 to 40 °C. A maximum heat load of 300 W (23.9 W/cm$^2$) at an evaporator temperature of no more than 80 °C was achieved at both a favorable and a horizontal orientation of the LHP. A minimum thermal resistance of the evaporator of 0.067 °C/W was obtained at a heat load of 220 W. The corresponding value of the LHP thermal resistance was equal to 0.084 °C/W. It has been found that under changes of orientation in the whole range of slopes the maximum heat load changes no more than 30 %. It is shown that a heat source temperature not more than 85°C can be ensured in all test conditions at heat loads up to 140 W.

**Keywords**

Loop heat pipe, flat evaporator, wick, thermal resistance, heat flux, heat load, electronics cooling.

**Nomenclature**

G – flow rate, l/min

ID - inner diameter, m