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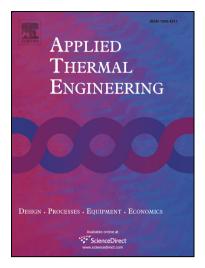
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CCEPTED MANUSCRIPT

Boiling and condensation heat transfer of inclined two-phase closed

thermosyphon with various filling ratios

Yeonghwan Kim<sup>1</sup>, Dong Hwan Shin<sup>1</sup>, Jin Sub Kim<sup>1</sup>, Seung M. You<sup>2</sup>, and Jungho Lee<sup>1</sup>\*

<sup>1</sup>Department of Energy Conservation Systems, Korea Institute of Machinery and Materials,

156 Gajeongbuk-Ro, Yuseong-Gu, Daejeon 34103, South Korea

<sup>2</sup>Mechanical Engineering Department, Erik Jonsson School of Engineering and Computer Science,

The University of Texas at Dallas, 800 W. Campbell Rd., Richardson, TX 75080, USA

\*Corresponding author

E-mail address: jungho@kimm.re.kr

**Abstract** 

The effect of the filling ratio and inclination angle on boiling and condensation heat transfer of the

two-phase closed thermosyphon (TPCT) was experimentally investigated using water as a working

fluid. The TPCT has the inner diameter of 25 mm and consists of evaporator, adiabatic and condenser

sections which are 300, 300 and 325 mm long, respectively. Local wall temperatures of both upper

and lower surfaces are measured to identify the variation of heat transfer coefficient based on the

circumferential location. The inclination angle varies from 5° (near horizontal) to 90° (vertical) and

the filling ratio is changed from 0.25 to 1.0, respectively. Boiling heat transfer coefficient in the TPCT

is higher than the Rohsenow correlation at the low heat flux below 100 kW/m<sup>2</sup> due to vigorous liquid

fluctuation at the evaporator, but it becomes lower than the correlation at the higher heat flux because

of the partial dry-out resulting from the large amount of vapor bubbles. Condensation heat transfer

coefficient is higher than the Nusselt correlation at the low heat flux, but once the stable condensate

film is formed on the surface, it has good agreement with the correlation. The present two-phase

closed thermosyphon shows the best thermal performance at the inclination angle of 30° and the

filling ratio of 0.5.

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