



University
of Victoria

Graduate Studies

Notice of the Final Oral Examination
for the Degree of Master of Applied Science

of

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BSc (Federal University of Santa Catarina, 2016)

**“Experimental Study of Two-Phase Closed Vertical Thermosyphons
for Sub-Ambient Temperature Applications”**

Department of Mechanical Engineering

Monday, December 3, 2018

1:00 P.M

Engineering Office Wing

Room 430

Supervisory Committee:

Dr. Andrew Rowe, Department of Mechanical Engineering, University of Victoria (Supervisor)

Dr. Rustom Bhiladvala, Department of Mechanical Engineering, UVic (Member)

External Examiner:

Dr. Phalguni Mukhopadhyaya, Department of Civil Engineering, UVic

Chair of Oral Examination:

Dr. Jane Ye, Department of Mathematics and Statistics, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

Abstract

Two-phase closed vertical thermosyphons (TCVT), also known as gravity-assisted heat pipes, are very efficient heat transfer devices. They work in two-phase close cycles where latent heat of evaporation and condensation is used to transfer heat, and are widely employed in industry applications. The increasing number of thermally efficient equipment that apply TCVT are explained by their high geometric flexibility and low cost, being important solutions for heat transfer and temperature control problems.

This research presents a brief guide on the design, manufacturing, and experimental testing of two-phase closed vertical thermosyphons (TCVT). The work was conducted at LEPTEN/Labtucal, a research laboratory in Brazil focused on applied heat transfer fields, which includes heat pipe and thermosyphon technology development. The design and manufacturing guidelines of a TCVT are described in details. All the manufacturing and testing of the system is conducted according to procedures presented in up-to-date literature, using proper equipment and following the steps previously established by other researchers. The experimental setup and methods to evaluate the designed TCVT performance are presented. Experimental results for two fluids (namely R141b and acetone) using different filling ratios are showed in order to obtain the percentage of fluid that yields the minimum temperature difference along the thermosyphon. Results are discussed and further analyzed to conclude the configuration that achieves best performance.