



**INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS**

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Thesis Title: Experimental Investigation on Condensation Heat Transfer Coefficient and Frictional Pressure Drop of Refrigerant R1234yf on Brazed Plate Fin Compact Heat Exchanger Surfaces

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SHORT ABSTRACT

Compact heat exchanger an improved heat transfer equipment, is being widely used in many industrial applications such as automobiles, aerospace, cryogenic, electronic cooling, oil and gas sectors. Among the various types of compact heat exchangers, brazed plate fin types are mostly preferred due to their compactness, higher effectiveness, reduced space and weight. Brazed plate fin compact heat exchangers generally use plain fins, serrated, perforated, wavy and louvered fins that offer large fin density. The single-phase heat transfer characteristics study in compact heat exchangers are more available when compared to the phase change heat transfer applications. However, there exists an extensive application of phase change heat transfer mechanisms in compact heat exchanger due to their better performance. There are many studies available using refrigerant R134a in literature. But the condensation study of low GWP refrigerant R1234yf is found to be limited in compact heat exchangers design and the works available are mostly for tubes, channels, mini-channels and micro-fins. Literature survey also indicates that the work on condensation heat transfer of refrigerant R1234yf inside brazed plate fin compact heat exchangers with serrated and wavy fin surfaces are not available.

Considering these gaps from the literature, the objectives of the present thesis works were defined, i.e. to carry out the condensation experiments using low GWP refrigerant R1234yf inside brazed plate fin compact heat exchanger with serrated and wavy fins. The primary objective is to determine condensation heat transfer coefficient and frictional pressure drop of refrigerant R1234yf. Initially, condensation investigations were carried out using refrigerant R134a and later experiments were further performed using R1234yf in brazed plate fin test condenser. The heat transfer and frictional pressure drop of R134a were found to be higher than that of R1234yf, operating at same condition. The effect of mass flux and saturation temperature on condensation heat transfer coefficient and frictional pressure drop of R1234yf was studied. Further, suitable correlations for condensation heat transfer coefficient and frictional pressure drop of R1234yf for brazed plate fin compact heat exchanger with serrated and wavy fins surfaces are proposed. This investigation shall be useful towards the design and development of compact condenser and its applications in wide areas like automobile, aerospace and various refrigeration industries.