ANALYSIS OF ENERGY PERFORMANCE OF DOMESTIC REFRIGERATORS

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Degree of Masters of Science

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Declaration

This report contains no material which has been accepted for the award of any other degree or diploma in any University or equivalent institution in Sri Lanka or abroad, and that to the best of my knowledge and belief, contains no material previously published or written by any other person, except where due reference is made in the text of this report

The work described in this report is carried out under the supervision of Dr. M. M. I. D. Manthilake and Prof. R. A. Attalage

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Abstract

One of the most common appliances in today's households is the refrigerator, for cooling and preserving food. Continuous maintenance of correct compartment temperature is the key factor which contributes to food quality at preservation, though it results in high energy utilization. It is estimated that refrigerator consumes one third of total electricity demand from a typical household. If energy efficient refrigerators could be identified from different models in the market, it would contribute towards individual and national level benefits. SLS 1230:2003 is the refrigerator testing standard in Sri Lanka for energy labeling of domestic refrigerators which has the key responsibility to illustrate energy efficient refrigerator models in the market. Further inverter-based refrigerators are the new tendency today, and there is limited number of studies comparing performance of inverter and non-inverter refrigerators and SLS 1230:2003 does not consider loading and temperature stabilization connected with energy performance of refrigerators are the limitations that motivated for carrying out this research. The aim of this research is to study the temperature stabilization rate along with energy consumption of inverter and non-inverter types of domestic refrigerators, after loading a given mass, and to apply the results to make necessary amendments to present refrigerators testing methodology in SLS 1230:2003. Experiments were accompanied with pairs of inverter and non-inverter refrigerators with unique capacity, manufacturer and brand, incorporated with door-opening, loading and cooling. Tests were carried out at Refrigerators Testing Laboratory at, National Engineering Research and Development Centre. As per results, inverter refrigerators consumed 22% less energy than non-inverter refrigerators but the models with inverters had low cooling rate and consumed 3 more hours to cool down 3kg of test load than non-inverter refrigerators. This result is beneficial to refrigerator consumers, manufacturers, dealers as well as policy makers when making decisions on energy efficient refrigerators.

Key Words: Domestic refrigerator, Energy performance, Inverter based refrigerators

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