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Development of Efficient R-134a A/C System of a Medium Size Car

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Abstract

Automotive air conditioning (A/C) system is constantly undergoing improvements over the past decades to achieve higher efficiency. Internal heat exchanger (IHX) so far, has not been given much importance to use in car A/C systems. The IHX transfers heat from the condenser outlet to the suction gas. Although previous researchers have investigated performance of IHX, this study can be distinguished from the previous studies with respect to the type, size and material used for its construction. This paper describes the one possible way to improve cooling capacity, COP and energy efficiency of R-134a A/C system of a medium size car. Three different experiments/tests are conducted under steady state conditions in a system test bench calorimeter, one without heat exchanger (baseline) and other two with different heat exchangers. The experimental results show that cooling capacity of car A/C system increases by 4.84% and 3.17%, COP increases by 11% and 7.18% and compressor input power is reduced by 6.05% and 4.18% with the use of copper and aluminum IHX, respectively.