

Experimental study on the replacement of hfc-r134a by hydrocarbons mixture in automotive air conditioner

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Abstrak

Performance characteristics of the current automotive air conditioning system have been evaluated in this experimental study which will evaluate the power consumption, cabin temperature and coefficient of performance (COP) at various internal heat loads and engine speeds using hydro-chlorofluorocarbons refrigerant (HFC-R134a) and automotive hydrocarbon mixture refrigerant (AHCR) as the working fluid of the compressor. Both refrigerants will be tested on the experimental rig which simulated the actual cars as an internal cabin complete with a cooling system component of the actual car including the blower, evaporator, condenser, radiator, electric motor, compressor and alternator. The electric motor acts as a vehicle engine, and then it will drive the compressor using a belt and pulley system, as well as being connected to the alternator to recharge the battery. The rig also is equipped with a simulation room acting as the passenger compartment. The tests have been performed by varying the motor speed; 1000, 1500, 2000, 2500 and 3000 rpm, temperature set-point; 21, 22 and 23°C, and internal heat loads; 0, 500, 700 and 1000 W. As for the results, the performance characteristics of the AHCR indicate the positive improvement of the system compared to HFC-R134a.