

## **Performance of Heat Pumps Charged with R170/R290 Mixture**

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In this study, thermodynamic performance of R170/R290 mixture is measured on a heat pump bench tester in an attempt to substitute for R22. The bench tester is equipped with a commercial hermetic rotary compressor providing a nominal capacity of 3.5 kW. All tests are conducted under the summer cooling and winter heating conditions of 7/45°C and -7/41°C in the evaporator and condenser respectively. During the tests, the composition of R170 is varied from 0 to 10% with an interval of 2% for R170/R290 mixture. Test results show that the coefficient of performance (COP) and capacity of R290 are up to 15.4% higher and 7.5% lower than those of R22 for two conditions respectively. For R170/R290 mixture, the COP decreases and the capacity increases with an increase in the amount of R170. The mixture of 4%R170/96%R290 shows the similar capacity and COP as those of R22. For the mixture, the compressor discharge temperature is 17-28°C lower than that of R22. For the R170/R290 mixture, there is no problem with mineral oil since the mixture is composed of hydrocarbons. The amount of charge is reduced up to 58% as compared to R22. Overall, R170/R290 mixture is a good long term 'drop-in' candidate to replace R22 in residential air-conditioners and heat pumps.