

Making Heat Pumps More Compatible with Environmental and Climatic Conditions

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Abstract : In this study, the effects of air temperature and relative humidity on the operation of the heat pump were examined experimentally. The results were analyzed in an energy and exergetic way. Two heat pumps were used in the experimental system established for experimental analysis. With the first heat pump, the relative humidity and temperature of atmospheric air are reduced. The air at low humidity and temperature is given heat and water vapor to the desired extent on the channel that reaches the other heat pump. Effects of the air reaching the desired humidity and temperature in the 2nd heat pump; temperature, humidity, pressure, flow, and current are detected by meters. The measured values and the exergy yield and thermodynamic favor ratios of the system and its components were determined. In this way, the effects of temperature and relative humidity change in the heat pump and components were tried to be revealed. Relative humidity in the air caused a significant increase in the loss of exergy in the evaporator. This has shown that cooling machines experience greater exergy in areas with high relative humidity. The highest COPSM values were determined to be at 30% and 40%, which is the least relative humidity values. The results showed that heat pump exergy efficiency was affected by increased temperature and relative humidity.

Keywords : relative humidity, effects of relative humidity on heat pumps, exergy analysis, exergy analysis in heat pumps, exergy efficiency

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