Improving efficiency of heat pumps by use of zeotropic mixtures for different temperature glides - DTU Orbit (30/12/2018)

**Improving efficiency of heat pumps by use of zeotropic mixtures for different temperature glides**

The present study demonstrates the optimization of a heat pump for an application with a large temperature glide on the sink and a smaller temperature glide on the source side. The study includes a simulation of a heat pump cycle for all possible binary mixtures from a list of 14 natural refrigerants, which enables a match of the temperature glide of sink and source with the temperature of the working fluid during phase change and thus, a reduction of the exergy destruction due to heat transfer. The model was evaluated for four different boundary conditions. For a separated evaluation of the irreversibility solely caused by the fluid properties, the exergy destruction in the heat exchangers has been distinguished accordingly and an indicator quantifying the glide match has been defined to analyse the influence on the performance. It was observed that a good glide match can contribute to an increased performance. Dependent on the boundary conditions a performance increase of 20.0 % for a simple cycle was observed and 26.9 % increase if the required superheating can be avoided. The temperature glide match in the source was identified to have a higher influence on the performance than in the sink.

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