Thermoeconomic comparison of industrial heat pumps

Four natural working fluids in various heat pump cycles are expected to cover the heating range between 50°C and 150°C. The different thermodynamic cycles are the Condensing Vapour, Transcritical and Compression/Absorption. As the considered technologies have significant differences in application, limitations and design, a generic comparison is used. To establish the optimal individual temperature range of operation, a thermoeconomic evaluation is performed, with heat price as the decision parameter. Each individual heat pump is favourable in specific temperature intervals, which will vary according to the temperature lift between sink and source. At temperature lifts below 30°C the entire temperature range is covered. Exceeding this temperature lift, the range of sink temperatures is not completely covered above 125°C. Three of the heat pumps prove very cost competitive when compared to heating with natural gas in a large part of the temperature range.

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