Zeotropic mixtures offer a possibility of optimizing heat pump cycle design by matching the working fluid temperature glide to the heat source and sink temperature profiles. Suitable heat transfer and pressure drop prediction methods are of paramount importance to evaluate the performance of plate heat exchangers (PHE) using such fluids. It is therefore relevant to evaluate the uncertainty in PHE performance estimation when zeotropic mixtures are used as working fluids. In this work, different correlations for the (Silver, 1947) and (Bell and Ghaly, 1973) method were compared to evaluate the evaporation heat transfer coefficient of mixtures of CO₂ and hydrocarbons at different mass compositions and subject to heat source temperature glides of 10K, 15 K and 20 K. Moreover, the impact of using different pressure drop models and correlations was included in the sensitivity study on the evaporator performance. Maximum deviations of 6% and 10% were obtained on the total heat transfer rate, depending on the prediction method chosen for the heat transfer coefficient and pressure drop, respectively. Larger discrepancies were found in the estimation of the mean UA value and total frictional pressure drops. Working fluids subject to the largest glide of 20 K resulted to be more sensitive to the choice of the prediction method. No recommended set of correlation was found, but similarities and differences between the different mixtures were identified and discussed.