This study analyzes an experimental investigation of an Organic Rankine Cycle (ORC) with R1233zd-E as working fluid in terms of measuring uncertainty. A methodology for an uncertainty analysis containing systematic errors and the propagation of random errors has been presented and exemplarily applied for the measuring uncertainty of the gross thermal efficiency. There, the uncertainty calculated from the manufacturers’ data sheet uncertainties and the measured uncertainties calculated with the empirical standard deviation have been compared resulting in the observation, that the empirical standard deviation is less for all experiments. Furthermore, the influence of using different Equation Of States (EOS) for the calculation of thermodynamic properties has been analyzed. It can be concluded, that the deviation between the Helmholtz-Energy EOS and the Peng-Robinson EOS is in the same order of magnitude as the measurement uncertainty.