

Accurate Measurements of the Superior Calorific Value of Methane by the Renewed GERG Calorimeter

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Due to the commercial transfer of billions of cubic meters of natural gases the knowledge of the superior calorific value of the main natural gases components is of outstanding interest. However, up to now the values given in ISO 6976 has been based on measurements made by Rossini[1] in 1931 and Pittam&Pilcher[2] in 1972. To establish more reliable values for the superior calorific values of methane and also of other main components of natural gases a Rossini-type reference calorimeter has been developed by Physikalisch-Technische Bundesanstalt (PTB) in Germany on behalf of the GERG-Association (Groupe Européen de Recherches Gazières). After the first measurements of methane, which confirmed the value given in ISO 6976 within the calculated uncertainty of 0.05 %, the GERG calorimeter was dismantled at PTB and moved to the thermodynamics institute at Ruhr-Universität Bochum. The necessary new setup of the GERG calorimeter has given us the chance for a very careful examination of both the hardware and the software of the GERG calorimeter. Some important improvements could be accomplished in both areas, which enabled us to significantly improve the precision of the obtained data. The resulting superior calorific value of methane agrees with previous measurements and assessments within the combined uncertainty, but is still significantly higher compared to experimental values reported most recently[3] and compared to the value given in ISO 6976, respectively. Based on a new approach that allows determining the mass of the burned gas by two methods (by online weighing of the flue gas and by weighing of the water absorbed during combustion and flushing), a systematic error in the Rossini-method can be demonstrated. This may have an impact on the superior calorific values of many hydrocarbons, as the Rossini-method has been widely used for their determination in the past century.

References

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