

New Key Comparison ahead

During the year of 2023 a combined EuReGa intercomparison and EURAMET Key Comparison has started and is expected to finish spring 2024. The comparison has now expanded the range of the harmonised cubic meter up to 25000 m³/h. In addition to the 8, 20 and 60 bar measurements, also measurements with atmospheric air will be performed to characterise the meters for use with the PTB turbine meter model [1].

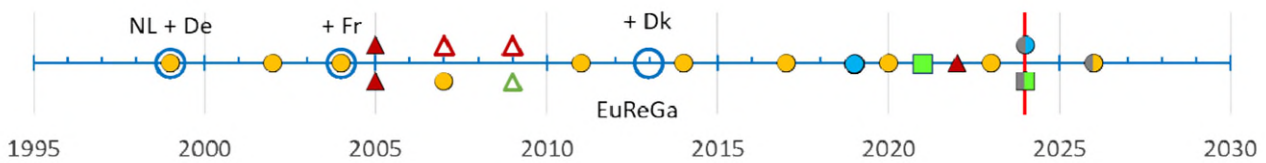


Figure 1: Updated timeline of intercomparisons using turbine gasmeters for high-pressure natural gas. The yellow dots indicate harmonisation intercomparisons, the solid red triangles BIPM key comparisons, the open red triangles subsequent bilateral comparisons, the green triangle a EURAMET bilateral comparison, the green squares EURAMET key comparisons and the blue dots the primary standards’ intercomparison. Symbols marked with grey indicate planned intercomparisons. The big blue circles mark the dates at which the labs joined the harmonisation consortium. In 2013 the cooperation was renewed under the EuReGa label.

EuReGa harmonisation intercomparison

A new combined EuReGa harmonisation intercomparison and EURAMET key comparison has started in 2023. This time the comparison has been extended to include a DN600 meter package including one turbine meter and one ultra sonic meter to include harmonisation up to 25000 m³/h at pressures from 8 to 60 bar. The testing for the comparison has started in July 2023 and will be finished in spring 2024 and finally the HRV will be calculated and a report will be written.

EURAMET key comparison

The Technical Protocol for the EURAMET key comparison will be made available and published on the BIPM website when all tests and reports are done.

Hybrid comparison

The bilateral comparison EURAMET project no. 1517 on primary facilities of VSL and FORCE has been finalised and a report “Pilot study on high-pressure natural gas primary calibration facilities” has been uploaded on the EURAMET website. The results shows that the normalised difference all agreed with more than 90% confidence, and none are

above the critical level which supports the CMC claims of the laboratories.

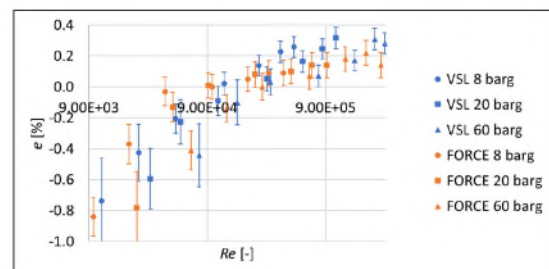


Figure 2: Meter deviation e [%] versus the Reynolds number Re [-] obtained with natural gas at high pressure. The symbol colors correspond to the participating laboratory and the symbol shapes to the calibration pressure. The combined uncertainty of calibration is indicated by the error bars.

EuReGa governance

The Assembly of Representatives consists of Erik Smits (VSL), Julia Hornig (PTB), Henri Foulon (LNE-LADG), Bo Holm Andersen (FORCE Technology).

The Team of Experts consists of Bodo Mickan, Thomas Lorenz, (PTB), Detlef Vieth (pigsar), Christophe Windenberger, Abderrahim Ouerdani (LNE-LADG), Fares Ben Rayana, (RICE/GRTgaz), Jesper Busk, Kurt Rasmussen (Secretary) (FORCE Technology), Menne Schakel, Marcel Workamp (VSL), Roy van Hartingsveldt, Mijndert van der Beek (Euroloop).

Outlook

For the next year the following activities have been planned, which is graphically displayed in Figure 1.

Table 3: Frequency distribution of observed E_n values

Histogram bin	Number	Percentage
$0 < E_n \leq 0.5$	26	61.9%
$0.5 < E_n \leq 1$	12	28.6%
$1 < E_n \leq 1.2$	4	9.5%
$E_n > 1.2$	0	0%
Total	42	100%

- In 2024 the harmonisation and the EURAMET key comparison will be finalised.
- In 2024 a primary intercomparison of all primary standards of EuReGa participants will take place. Césame and PTB will use three sonic nozzles. FORCE, VSL and PTB will use piston provers to calibrate a rotary gasmeter. As the sonic nozzles will be calibrated using PTB's piston prover all labs can be compared.

Conclusion

With a successful completion of the harmonisation exercise in 2024 including EURAMET key comparisons and the settlement of the EuReGa governance, EuReGa looks back

at a successful period. In addition, EuReGa has many plans for the years to come.

References

- [1] Jos G.M. van der Grinten, Arnthor Gunnarsson, Mijndert van der Beek and Bodo Mickan (2019): [An intercomparison between primary high-pressure gas flow standards with sub-permille uncertainties](#), 35th International North Sea Flow Measurement Workshop, Tønsberg, Norway, 22 - 24 October 2019, Reprinted in Cal Lab: The International Journal of Metrology, [vol 27\(4\), 2020](#), pp 28-35.