

EuReGa Harmonization intercomparison 2023-2025 finalised.

After the successful intercomparison of 2020 a new inter-comparison was started in 2023. The harmonization comparisons fit in a long tradition of intercomparisons in the field of high-pressure natural gas. The participants are PTB using the Pigsar facilities, VSL using the Euroloop facilities, LNE-LADG operated by CESAME Exadébit, and FORCE Technology. Together these organizations form the EuReGa consortium (EUropean REFerence for GAs metering). The intercomparison measurements were conducted after re-calibration of the participants' facilities. The re-calibration is based on the independent traceability chains of the EuReGa-members.

Due to delays and development of software handling the data analysis, the intercomparison was finalised mid-2025. A new software has been developed to integrate and analyse all the data from all participants which will reduce the analysing work and time. It was the intention to expand the comparison to include the range of the harmonised cubic meter up to 25000 m³/h. In addition to the 8, 20 and 60 bar measurements. Due to some unforeseen technical issues, the expansion of the comparison was not realised and will have to wait to next harmonisation comparison.

The final results show an excellent agreement between the laboratories with 98 % of all results within an E_n value of 1,0.

Normalized deviation E_n

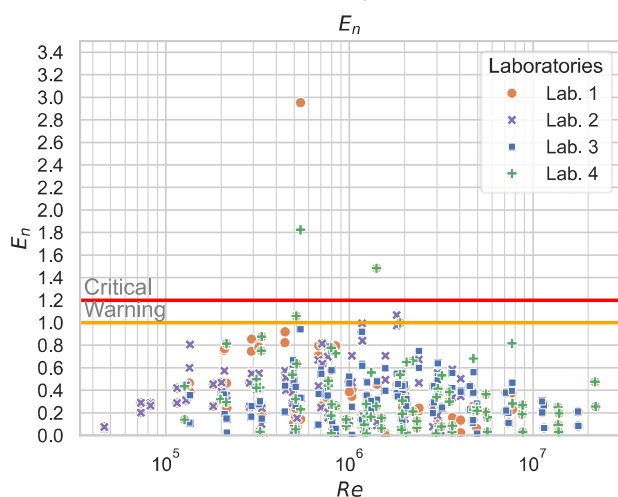


Figure 1 Absolute E_n [-] values versus Re number [-]. The yellow line is warning level corresponding to $E_n = 1$. The red line is the critical level corresponding to $E_n = 1,2$.

Figure 1 shows the absolute E_n values with respect to the HRV

level. The yellow line is the warning level corresponding to $|E_n| = 1$. The red line is the critical level corresponding to

$|E_n| = 1,2$.

Table 1: Frequency distribution of observed absolute E_n values.

	Number	Percentage
$0 \leq E_n \leq 0,5$	394	79 %
$0,5 < E_n \leq 1,0$	95	19 %
$1,0 < E_n \leq 1,2$	4	1 %
$ E_n > 1,2$	4	1 %
Total	497	100 %

Approximately 80 % of the data match $E_n \leq 0,5$. And 98 % of results are below the warning level of 1,0 %. Four out of approximately 500 calibration points are above the critical level. Considering that the E_n criteria have a 95 % confidence level, these results are acceptable.

After implementation of the Harmonized reference value (HRV)

After the laboratories have implemented their new harmonized reference values some residues remain. These are schematically displayed in Figure 2. This figure shows that most of the residues lies with $\pm 0,1$ %.

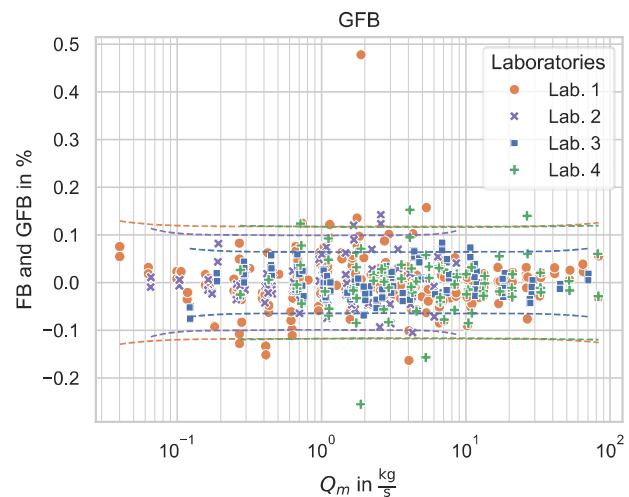


Figure 2: after implementation of the HRV by all laboratories

It was decided that for the next harmonization intercomparison, the DN600 meters will be included to reach a harmonized cubic meter of 25000 m³/h, which is significantly more than the current maximum flow rate at 6500 m³/h.

Meetings

The harmonization group held two meetings in 2025, one online meeting in May and one “in person” meeting in November at the location of VSL, in Delft, the Netherlands.

EuReGa governance

The Assembly of Representatives consists of Erik Smits (VSL), Julia Hornig (PTB), Henri Foulon (LNE-LADG), open (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/Natran), Jesper Busk, Bojan Zecevic and Kurt Rasmussen (Secretary) (FORCE Technology), Menne Schakel and Marcel Workamp (VSL), Mijndert van der Beek and Rens van den Brink (Euroloop).

Outlook

For the next year the following activities have been planned.

- Start up a new harmonization intercomparison
- Expert meeting on the 26th of May.
- Annex 3: Methods and procedures of unification (harmonization) of reference value is part of the MoU signed in 2013. A new draft is revised to include the DN600 meters.

Conclusion

In 2025 the 25th anniversary of EuReGa in 2024 was celebrated by illustrating the benefits of harmonization for the European gas grid to the society. With a successful completion of the harmonization exercise in the years 2023 to 2025, EuReGa looks back at a successful period even though delays and technical issues occurred. In addition, EuReGa has many plans for the years to come.