

CCQM-K68.2019  
Nitrous oxide (N<sub>2</sub>O) in air, ambient level  
Support to Measurement Capabilities

## Preamble

This guidance note is aimed at reviewers of calibration and measurement capabilities, supported by the participation in a key comparison. In principle, support to measurement capabilities is limited to those measurement results that are consistent with the key comparison reference value (KCRV). In this key comparison, some measurement results were not consistent with the KCRV. For those results, this guidance note provides larger expanded uncertainties, based on the inclusion of a suitably large fraction of dark uncertainty, as described in the final report [1]. The idea behind these larger uncertainties is that:

- a) National Metrology Institutes (NMIs) can still use their participation in a key comparison to support their measurement service;
- b) The stated uncertainty is large enough to ensure comparability with the KCRV and the results of other NMIs;
- c) There is a harmonised way of dealing with discrepant results in relation to CMCs.

Discrepant measurement results can occur for a number of reasons. For a discussion of the measurement results in CCQM-K68.2019, see the final report [1]. In case of incidental discrepant results, the default response would be to investigate the cause of the discrepancy and to resolve it [2]. Hence, the attached table should not be viewed as:

- a) A substitute for appropriate corrective measures from the side of the NMI to resolve the discrepancy;
- b) A consent from the GAWG that the submitted measurement result is acceptable;
- c) A guarantee that a CMC submitted in accordance with this guidance note will be accepted by reviewers in the review process by the Regional Metrology Organisations;
- d) Support for the metrological traceability of the measurement result submitted;
- e) A direction or recommendation to assessors in peer reviews or accreditation visits.

## Support to CMCs

Table 1 shows the ranges of the amount fractions and associated expanded uncertainties supported by participation in CCQM-K68.2019 [1], calculated in accordance with the GAWG Strategy document [3]. The value shown for each participant represents a pooled uncertainty based on two submitted results, as listed in Table 7 of the final report [1]. Laboratories with an asterisk (\*) indicate uncertainties that were “adjusted” (i.e., inflated), because at least one of the submitted measurement results was not consistent with the KCRV without the incorporation of dark uncertainty.

**Table 1.** Supported ranges and expanded uncertainties ( $k = 2$ ) for nitrous oxide in air and nitrous oxide in nitrogen.

	Lower Bound (LB) / nmol mol <sup>-1</sup>	Upper Bound (UB) / nmol mol <sup>-1</sup>	U(LB) / nmol mol <sup>-1</sup>	U(UB) / nmol mol <sup>-1</sup>	U(LB) / %	U(UB) / %
FMI	200	400	4.98	6.14	2.49	1.53
KRISS*	200	400	0.74	0.89	0.37	0.22
NIM	200	400	0.52	0.61	0.26	0.15
NIST*	200	400	0.65	0.77	0.33	0.19
NMISA	200	400	0.37	0.44	0.19	0.11
NOAA	200	400	0.61	0.73	0.31	0.18
NPL	200	400	1.10	1.33	0.55	0.33
VNIM	200	400	3.10	3.68	1.55	0.92
VSL	200	400	1.50	1.75	0.75	0.44

## References

- [1] J. Viallon, T. Choteau, E. Flores, F. Idrees, P. Moussay, R. I. Wielgosz, J. S. Lim, Jeongsoon Lee, Jinbok Lee, D. Moon, J. I. T. van Wijk, S. Persijn, A. M. H. van der Veen, O. V. Efremova, L. Konopelko, Y. Kustikov, A. Kolobova, A. Klimov, Z. Bi, C. Cecelski, J. Carney, B. Toman, A. Possolo, B. Hall, P. Brewer, D. Worton, K. Saarnio, H. Aaltonen, J. Tshilongo, D. Mphara Mogale, G. Mphaphuli, and P. Mohweledi Marebane. CCQM-K68.2019, nitrous oxide (N<sub>2</sub>O) in air, ambient level, final report. *Metrologia*, 60(1A), 2023.
- [2] ISO. *ISO/IEC 17025 General requirements for the competence of testing of calibration laboratories*. International Organization for Standardization, Geneva, Switzerland, 2017. Third Edition.
- [3] P. Brewer and A. M. H. van der Veen. *CCQM-GAWG strategy for comparisons and CMC claims*. Gas Analysis Working Group, Sèvres, France, October 2019.