May 16, 2023

Statement 2 of the CCM WG PV on the content of CMC entries for pressure, vacuum and molar flow rate[1]

The CCM WG PV wishing to make the CMC entries in the scope of the CCM WG PV more user friendly and adapted to the needs of the NMI customer

and

considering the relevant CIPM documents CIPM 07/11, CIPM-D-01, and CIPM MRA-P-11 to -P-13, CIPM MRA-G-11 to -G-13

establishes the following guidelines for CMC entries in the field of pressure and vacuum in the scope[2] of the CCM WG PV:

1. CMC entries in the field of the CCM WG PV shall be oriented towards the unit under calibration (UUC, also called device under test DUT) and not only on the realized pressure or mass flow scale. This means that CMC entries may have overlapping ranges.
2. In column "Instrument or artifact under study" should appear the special type of pressure, vacuum gauge or leak standard to be calibrated, the unit under calibration (UUC, see 3). In column "Quantity" shall be written "absolute pressure", "differential pressure", "gauge pressure", or "molar flow rate" and in column "Instrument type or method applied" the calibrator or method used by the NMI/DI. Possible entries herein are “pressure balance”, “Hg-manometer”, “static expansion”, “continuous expansion”, “refractometer”, “atom trap” etc. or the reference gauge used by the NMI/DI.
3. Only those gauges may be considered as UUC in the CMC entries being identified in the actual Statement 3 by the CCM WG PV “Pressure and Vacuum: Agreement on the uncertainties of the best units under calibration for consideration in CMC entries”. The regular or alternative name of the UUC stated therein may be used. If, in rare cases, the NMI/DI is not able to calibrate the UUCs listed in Statement 3, the alternative[3] UUC shall be listed in the CMC entry, but the uncertainty of this must not be lower than the one listed in Statement 3 for the same pressure range.

[1] This statement was approved at the CCM PV meeting on May 16, 2023 in Rockville, Maryland, USA, and updates the previous one from May 11, 2017.
[2] Molar flow rate for leak standards also belongs to the scope CCM WGPV, but is categorized in FF (fluid flow).
[3] As “alternative“ it is understood the UUC, which is the best UUC (lowest uncertainties) that the NMI/DI can calibrate.

4. If applicable, in column “International Standard” the relevant ISO or national standard shall be listed. For comparison with a reference standard of the NMI/DI, ISO 3567, ISO 27893 and the relevant ISO standard for the specific vacuum gauge, if applicable, shall be named: ISO 20146 for CDGs, ISO 24477 for SRGs. If CDGs of SRGs are the relevant UUC, these ISO standards may[4] also be cited, when the measurement standard is a fundamental standard like a Hg manometer or static expansion system.

5. In column "Parameters" it shall be specified in separate lines with their specifications the following.
   For the pressure field: gas or oil medium, line pressure,
   for the vacuum field: temperature, gas species and gas purity.

6. Uncertainties, if not given by a formula, shall be given with two significant digits. Thereby, the “minimum value” of uncertainty corresponds to the uncertainty at the minimum value of measurement range, the “maximum value” of uncertainty to the uncertainty at the maximum value of measurement range. The reader will assume that a linear interpolation is possible in between. This is one of the options specified in the CIPM MRA-G-13. This provides four different options: fixed value throughout the measurement range; as a range with linear interpolation in between boundaries; as explicit function; as table, with entries depending on measurand and one or more other parameters.

[4] This is a recommendation.