

**CCAUV Instructions for completing CMC entries**

When completing the basic Excel template for AUV CMCs in the [JCRB web page](#), the following points should be addressed:

1. Calibrations issued without specified units should not be used as a basis for CMC entries.
2. All entries in the EXCEL files should be in “text” format and Arial 10 font.
3. Instruction 7 should be interpreted as “No” for all dB entries and “Yes” for all “%” entries.
4. Complicated units should be expressed using superscripts where necessary e.g. pC/(m/s<sup>2</sup>). Do not use superscripts for powers of 10 but e.g. 1E-09.
5. If there is no specified minimum and maximum value for a quantity, these two columns should be left blank rather than using “NA”.
6. If a quantity depends on two parameters e.g. frequency (10 Hz to 1 kHz) and acceleration amplitude (10 m/s<sup>2</sup> to 500 m/s<sup>2</sup>), or frequency and microphone type then two sets of cells should be completed, one below the other, with all other equivalent cells on the second line being left blank e.g.

Sound pressure level	sound calibrator multifrequency	calibrated measurement microphone	70	115	dB (re 20 µPa)	frequency	31 Hz to 2 kHz	0.12	dB
						microphone type	LS2P		

7. Ranges for parameters should be indicated “X unit to Y unit” and not “X-Y unit”.
8. Preferably a single value of uncertainty should be stated and not a range as ranges can be ambiguous, unless this is over a very small range or is obviously linear. If different uncertainties relate to different ranges of the parameter, separate CMCs should be indicated for the capabilities.
  - 8.1. The statement of an uncertainty within a CMC entry should be based on a careful consideration of all uncertainty contributions of Type A and B following the “Guide for the expression of uncertainties in measurement” ([GUM](#)) as published on the BIPM website.
9. Uncertainty functions stated in the format  $Q[20/W, 3]$  should be explained at the beginning of the CMC listing. For example as  $\sqrt{\left(\frac{20}{W}\right)^2 + 3^2}$ , which expression is difficult to place inside the EXCEL format.
10. Signs such as < and > may be used in column H “Specifications”.
11. The white “comments” column may be used to explain anything that is not explicit elsewhere. e.g. “velocity and displacement can be derived from acceleration” and “angular velocity and rotation angle can be derived from angular acceleration”. The blue "comments" column is for reviewers only and will not be visible on the web.

12. In the column “List of comparisons” a comparison should be listed if the measurement is linked to a standard which has been compared, even if the measurement itself has not been compared directly. The CCAUV can give guidance on the range over which a comparison may be cited. Comparisons “in progress” should be listed without the words “in progress”.
13. It is recommended that all CMCs should be linked to a comparison. However, if the comparison listed is more than 10 years old, then the NMI must provide additional information, as specified by the JCRB in Section 8 of [CIPM MRA-D-04](#), to support the CMC. This additional information must be accessible to reviewers and may be indicated in the white “comments” column with a note in the “List of comparisons” indicating “see Comments column”.
14. Results of key, supplementary and bilateral comparisons are important to provide evidence for the validity of CMC claims and the points below should be followed:
  - 14.1. Reference to key, supplementary or bilateral comparisons can only be used to support uncertainties that are greater or equal to those stated for the corresponding measurement in the key comparison.
  - 14.2. A laboratory may, however, wish to re-evaluate the uncertainties after a successful key comparison or because of changes and improvements in the technical equipment, methods and procedures, staff education, or other conditions. In this case the procedure given in point 14.3 of this guideline is mandatory.
  - 14.3. For the re-evaluation, a new uncertainty budget must be established. For the review process within the RMO and also for the international review all changes in the uncertainty budget must be marked in **red bold**. In an accompanying letter a brief rationale is to be given for the improvement of the uncertainty values which should be confirmed by appropriate and convincing evidence. It lies within the responsibility of the CMC referees to decide whether the given evidence is plausible.
  - 14.4. When the degree of equivalence, or the linked degree of equivalence, represented by the difference  $d_i = x_i - x_{KCRV}$  and the expanded uncertainty  $U(d_i) = k \cdot u(d_i)$  do not fulfil the condition  $|d_i| < U(d_i)$ , the NMI should investigate the possible causes and, if necessary, they should increase their uncertainty accordingly for the relevant CMC claims, or request that their CMCs, which are affected, be greyed-out until a bilateral or other comparison can be undertaken.
  - 14.5. These guidelines should also be followed in relation to the outcome of supplementary comparisons.
15. The column for the NMI service identifier was proving useful for database management by enabling quick location and correction of any entries. NMIs are encouraged to use unique alphanumeric values for each CMC, or to have alphanumeric values which relate to only a small range of CMCs. These values will also be indicated in the database so NMIs can choose to use their normal calibration service codes if these would be appropriate for this purpose.