

LCA Guidance on Calibration of Water Testing Equipment

1. Field based water testing equipment used by members (thermometers, pH meters, conductivity meters, photometers, etc.) needs to be fit for purpose and accurate. To ensure the equipment continues to give reliable and accurate results throughout its life it needs to be regularly checked and calibrated. Some types of equipment may require more checking and calibration than others, but members must have a management procedure that ensures their equipment is suitably calibrated and the results of this checking and calibration recorded (LCA Commitment 3.4).
2. In some settings, equipment may require calibration depending on its use but it can also be used as a relative value. In this case calibration may not be necessary for effective use, for example cooling tower REDOX controllers.

Frequency of Calibration

3. The frequency of calibration needs to be fit for the intended use of the equipment. Manufacturers rarely give suggestions for frequency of calibration and members need to have a suitable management procedure. Reagents and reference standards should be in date and used in accordance with the equipment instructions. Reference standard solutions should be changed regularly and if contamination suspected should be immediately changed and the old solution safely disposed of.
4. Equipment for pH should have an annual traceable calibration at least once per year and should be checked daily (if used every day) or prior to use. Equipment for pH should be stored in the correct solution to avoid degradation of the reference solution within the probe. Demineralised water should not be used as it will dilute the reference solution. Storage solution or pH 4 buffer may be suitable.
5. Conductivity meters should have an annual traceable calibration at least once per year and functionally checked each time they are used.
6. Any testing equipment should be calibrated at any time there is reason to suspect the readings are not correct.
7. Thermometers must be fit for purpose and can be purchased with certified calibration to traceable national standards. This calibration is normally for a year and this should be repeated annually. Thermometers can alternately be validated against a reference instrument or with boiling DI water, then an ice water mixture (to give two points of reference at 100°C and 0°C).
8. Photometers should be calibrated against reference standards according to manufacturer's instructions but at least annually. Photometers should be checked before each use to ensure cuvettes are in good condition (not cracked, scratched, discoloured, dirty, etc.) and reagents are in date.

Types of Calibration

9. The International Bureau of Weights and Measures (BIPM) define a calibration as "the documented comparison of the measurement device to be calibrated against a traceable device".

Check Calibration or Validation

10. Routine checking of an instrument against either a known reference value or an instrument of known calibration (reference instrument). This is the most frequent of the expected types of calibration.
11. The use of reference standard solutions (prepared to the reference standard) for calibration or the validation against a reference instrument in the field or an LCA members premises is adequate to ensure accuracy in the field for most water treatment purposes.

Annual Traceable Calibration

12. This process can be performed in-house with traceable reference standards or instruments, or by using a suitable external calibration service. The member's management procedure should cover this requirement, detail the acceptable tolerances and the record the process.