



Performance Standard for Organisations Undertaking Sampling and Chemical Testing of Water - Part 1

**V1.1 briefing note 2
September 2009**

Use of portable instrumentation and test kits by MCERTS accredited sampling organisations.

1. Introduction

If portable instrumentation or test kits are to be used in the field for regulatory compliance monitoring of effluents then procedures and practices shall comply with MCERTS and ISO 17025.

Where available, instruments certified to the MCERTS “Performance Standards and Test Procedures for Portable Water Monitoring Equipment” should be used. Manufacturer’s instructions for calibration and operation should be followed, field AQC requirements are given below.

All tests kits and instruments with or without MCERTS certification to the MCERTS “Performance Standards and Test Procedures for Portable Water Monitoring Equipment”, shall undergo a validation procedure, as well as routine calibration and AQC, to ensure they can achieve the required performance.

One of the main criticisms of the use of portable instruments and test kits in the field is the lack of training given to staff that use them. Hence inconsistent and erroneous results from their misuse often occur, which is not acceptable for regulatory compliance monitoring. Manufacturer’s training resources shall be used if available and appropriate. At least one member of staff shall be fully trained in the use of the instrument and/or test kit, have a good understanding of its basis of operation, fault finding and quality control, and be able to train others in its use.

Operating procedures shall be fully documented and available in the field for users.

As the analytical systems are used outside of a controlled laboratory environment, particular care shall be given to their cleaning, storage and maintenance.

2. Validation of pH and specific conductivity field instruments

The full validation procedure detailed in clause 5.3 of the MCERTS Performance Standard for Organisations Undertaking Sampling and Chemical Testing of Water – Part 1 shall be carried out for each model and probe/electrode combination in use. One validation exercise could encompass all instruments used in the field, if all of the model and probe/electrode combinations are identical. Validation may be performed under laboratory conditions. If it is not appropriate to use spiking experiments, matrix samples and standards may be used.

Further limited verification tests shall be carried out on any additional instrumentation (if it has the same model and probe/electrode combination) using clause 5.3.5.1. of the MCERTS Performance Standard for Organisations Undertaking Sampling and Chemical Testing of Water – Part 1. This can be carried out after instrument calibration before first use in the field. An appropriate standard and one appropriate matrix sample shall be used. Seven replicates of each would be considered acceptable.

3. Validation of Chlorine test kits

The full validation procedure detailed in clause 5.3 of the MCERTS Performance Standard for Organisations Undertaking Sampling and Chemical Testing of Water – Part 1 shall be carried out for each model in use. Further limited verification tests shall be carried out on any additional instrumentation (same model) using clause 5.3.5.1. of the MCERTS Performance Standard for Organisations Undertaking Sampling and Chemical Testing of Water – Part 1. This can be carried out after instrument calibration before first use in the field. An appropriate standard and one appropriate matrix sample shall be used. Seven replicates of each would be considered acceptable.

4. Performance requirements

Performance requirements for pH and residual chlorine are given in Annex A of the MCERTS Performance Standard for Organisations Undertaking Sampling and Chemical Testing of Water – Part 1 .

For specific conductivity, precision and bias of not greater than 2% is required.

For pH and conductivity bias can be determined from standard solutions used in validation. Precision shall be determined from samples used in validation

5. Calibration

- Each piece of equipment should be uniquely identified and recorded.
- A calibration timetable shall be drawn up, and each instrument clearly labelled as to when recalibration is required. It may not be necessary to calibrate pH and Electrical Conductivity [EC] meters daily (see AQC checks).
- A record of calibration events shall be kept.
- For pH and conductivity measurements, thermocouples and thermometers shall also be calibrated.
- Clause 5.4 of the MCERTS Performance Standard for Organisations Undertaking Sampling and Chemical Testing of Water – Part 1 shall apply.

6. AQC requirements for pH and specific conductivity field instruments

Quality assurance checks using AQC samples shall be carried out during sampling runs when the meter is in use. Results shall be recorded and plotted on appropriate control charts after analysis of the AQC and checked against current control chart limits before the associated sample results are reported.

Clauses 5.6.3.2. and 5.6.3.4 of the MCERTS Performance Standard for Organisations Undertaking Sampling and Chemical Testing of Water – Part 1 shall apply where appropriate.

For pH - An AQC sample shall be measured at the beginning of the day before the first sample reading is taken and at the end of the day after the last sample has been analysed. If more than 38 samples are analysed in a day further AQC samples shall be measured to ensure that AQC samples comprise at least 5% of the samples measured.

If making measurements in low conductivity samples ($<100\mu\text{S}\cdot\text{cm}^{-1}$) then a low conductivity pH 4 check solution shall be used.

For Specific conductivity – As for pH, but if measuring in low conductivity or saline water then an additional more appropriate conductivity AQC sample shall be used.

Note: It is possible to use the same check/AQC solutions for conductivity and pH.

In addition, for all instruments, manufacturer recommended system suitability checks shall be carried out and the results recorded.

Proficiency testing shall be undertaken for all parameters for which appropriate schemes are available and shall be undertaken on-site.

7. AQC requirements for chlorine test kits

Users shall follow the requirements of the Drinking Water Inspectorate, which are published as “Guidance on calibration and analytical quality control for residual chlorine measurements”.

Clauses 5.6.3.2. and 5.6.3.4 of the MCERTS Performance Standard for Organisations Undertaking Sampling and Chemical Testing of Water – Part 1 shall apply where appropriate.

Proficiency testing shall be undertaken if appropriate schemes are available.

8. Instrument care

The following procedures shall be documented, and where appropriate records of implementation shall be kept:

- storage conditions for instruments and probes, when in use and when not, short term and long term;
- replacement of consumables, e.g. reagents, o-rings and membranes;
- cable and connector inspections and replacement;
- cleaning of instruments and probes;
- updating firmware and software.

9. Temperature

Temperature measurement is not in Annex A but accreditation for the MCERTS (waters) standard can be granted for this parameter provided the relevant requirements of ISO 17025 are met.

10. References

1) BS 1427 Guide to on-site test methods for the analysis of waters

2) DWI Guidance on calibration and analytical quality control for residual chlorine measurements 2005

3) Performance Standards and Test Procedures for Portable Water Monitoring Equipment June 2009 Environment Agency Version 2