Proficiency testing schemes for sampling

Introduction

This leaflet gives some hints on the application of ISO/IEC 17043 [1] for PT providers organising PT schemes for sampling. If there is a comparison between participants and a mechanism for performance evaluation which meets the objective of the PT scheme for sampling, then ISO/IEC 17043 is applicable.

Types of PT schemes for sampling

Type 1: Only the sampling procedure is taken into consideration and evaluated. Performance assessment can be done through a pre-established scoring system or set of criteria. The performance can be assessed by deviations from a standard procedure or through an audit process where experts judge the performance of the participant.

Type 2: Samples collected by the participants are tested by a single laboratory chosen by the PT provider who must ensure that validated test methods with low variability are used. Thus, the variability obtained is attributed to the sampling and not to the test method.

Type 3: The performance of the participant is based on the testing results, and comprises both sampling procedures and test methods. Here the participant can perform the test at the sampling site or at their laboratory. The use of an additional appropriate reference material, ideally a certified reference material, provided by the PT provider to each participant, enables the analytical bias to be determined. Thus, the performance assessment is based on the sampling procedures and test methods combined or separately.

How to apply ISO/IEC 17043 to sampling PT

The following requirements from ISO/IEC 17043 might need some particular consideration for sampling PT:

- **Personnel**: The demonstration of the competence (knowledge of the planning of sampling, sampling techniques and preparation of sampling sites) of the personnel involved in organizing the sampling PT scheme.
- **Equipment, accommodation and environment**: Environmental conditions should be taken into consideration by including them in the performance evaluation or by minimising or eliminating their influence.
- **Planning**: Production, quality control, storage and distribution of proficiency test items for sampling PTs can be interpreted as "requirements for the sampling site" and handling/transportation of the samples once the sampling is performed.
- **Preparation of PT items**: The sampling site must be prepared to ensure that each participant performing the sampling has an equivalent challenge (possible influences: rain, wind, temperature, participant, etc.).
- **Homogeneity and Stability**: The item that is being sampled should be as similar as possible for all participants during the sampling exercise. Special care should be taken to minimise the influence of any previous participants in the exercise, for example by causing drill holes. Dynamic systems such as a river by their nature are constantly changing and therefore may not be homogeneous or stable.

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- **Statistical design**: ISO 13528 [2] should be considered when establishing the statistical design. It is important to distinguish between the sampling procedure and the test method in the statistical design, which will depend on the type of sampling PT. Sample transport effects that could have an influence should also be considered.
- **Assigned value / Evaluation criteria**: The determination of any assigned value will depend on the type of sampling PT. The evaluation criteria should also consider the pre-sampling (e.g. container used) and the post-sampling (e.g. sample storage and transportation) aspects.

- **PT items handling and storage**: It should be considered that the PT item includes both the sampling site and the samples taken during the sampling activity.
- **Packaging, labelling and distribution of PT items**: The PT provider should provide clear instructions when specific labelling and packaging is required. Where there is a direct measurement the requirements of this section are not applicable.
- **Data analysis and records**: Where the performance evaluation is based on a comparison to a reference procedure, this can be purely qualitative. Alternatively, observed deviations can be converted to numerical scores (e.g. 0 for negligible, 1 for minor, 2 for major) and some appropriate statistical data analysis performed.
- **Confidentiality and Collusion**: When all the participants (or groups) are performing the sampling at the same time, then this must be made clear to the participants since confidentiality cannot be ensured and reasonable precautions need to be taken to prevent collusion given this situation.

Conclusion

PT schemes for sampling play an important role in the improvement of sampling procedures and also in the development of participants from an educational point of view, especially if workshops with the participants are organised. PT schemes for sampling can also give an appreciation of the contribution of the sampling in relation to the overall quality of the measurement, including the associated contribution to the measurement uncertainty.

More information and further reading

Information about PT providers and schemes can be obtained from your national accreditation body, from the EPTIS website (www.eptis.org) or from other national or international organizations.

* Proficiency testing of sampling. AMC Technical Brief 78, 2017 - https://doi.org/10.1039/C7AY90092A

Eurachem Guides/Leaflets:
* Selection, Use and Interpretation of Proficiency Testing Schemes by Laboratories, 2nd edition, 2011
* Measurement uncertainty arising from sampling, 2nd edition, 2019
* Leaflet on Pre- and post-analytical proficiency testing, 1st edition, 2009

[1] ISO/IEC 17043:2010 Conformity assessment — General requirements for proficiency testing
[2] ISO 13528:2015 Statistical methods for use in proficiency testing by interlaboratory comparison

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