

Standard for Evaluation of Measurement Uncertainty in Forensic Toxicology



WHAT IS AN AAFS STANDARD FACTSHEET?

The AAFS produces clear, concise, and easy-to-understand factsheets to summarize the contents of technical and professional forensic science standards on the OSAC Registry. They are not intended to provide an interpretation for any portion of a published standard.

WHAT IS THE PURPOSE OF THIS STANDARD?

This standard establishes minimum requirements for evaluating measurement uncertainty (MU) in quantitative forensic toxicology testing and the calibration of breath alcohol measuring instruments. However, it does not address the evaluation of measurement uncertainty for breath alcohol testing or qualitative forensic toxicology testing activities.

It applies to toxicology testing in the following subdisciplines: postmortem forensic toxicology, human performance toxicology, non-regulated employment drug testing, court-ordered toxicology, and general forensic toxicology.

This standard is to be used in conjunction with the latest editions of [ANSI/ASB 017](#), [ANSI/ASB 036](#), [ANSI/ASB 053](#), [ANSI/ASB 054](#), [ANSI/ASB 055](#).

WHY IS THIS STANDARD IMPORTANT? WHAT ARE ITS BENEFITS?

There is a level of expected variability in quantitative measurements because measured values are dependent on other factors, including the setup and capabilities of the measuring system, the exact measurement method (procedure) used, and the person performing the measurement. By establishing minimum requirements for MU, this standard seeks to increase confidence in the validity of the measurement results.

Comparing quantitative test or calibration results between testing laboratories or evaluating quantitative results in relation to a legal specification or requirement necessitates knowledge of the MU.



HOW IS THIS STANDARD USED, AND WHAT ARE THE KEY ELEMENTS?

This standard is used by forensic science service providers (FSSPs) to evaluate and report uncertainties for toxicology quantitative testing determinations and for the calibration of breath alcohol measuring instruments. FSSPs are required to evaluate MUs for each measurement process. Each testing combination of analyte, extraction, and analytical technique is evaluated separately for MU, as is each calibration method.

The MU evaluation process is modeled after an 8-step framework developed by the National Institute for Standards and Technology (NIST) to evaluate and report MU. The steps in the standard include:

1. Specify the Measurement Processes
2. Identify Uncertainty Components
3. Quantify Uncertainty
4. Convert Quantities to Standard Uncertainties
5. Calculate the Combined Standard Uncertainty
6. Calculate the Expanded Uncertainty
7. Evaluate the Expanded Uncertainty
8. Report the Expanded Uncertainty

Periodic review and recalculation of each method's MU is also mandated to provide an MU that remains fit for purpose over time. Records of MU evaluations and reviews must be maintained.

