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# Best Practice Guide: Lab Weighing

Experience gained from 150 years of weighing expertise combined in a series of white papers

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## Abstract

In addition to its wealth of technological experience accumulated over the years, the Sartorius Group also has decades of metrological expertise to offer.

With its series of white papers that will gradually be compiled into a Best Practice Guide: Lab Weighing, Sartorius provides practical answers to the most important questions and issues revolving around the subject of weighing in the laboratory. Among the topics discussed in these white papers are calibration, accreditation, legal metrology and correct weighing. As a result, these white papers will give users all the knowledge needed to obtain accurate and reliable weighing results.

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# Best Practice Guide: Lab Weighing

- What do I need to be aware of when I use laboratory balances?
- How often should balances be checked and calibrated?
- How do I interpret a calibration certificate correctly?
- What is the advantage of an accredited service provider?
- How can I be sure that my equipment will pass the next quality audit?
- Which requirements are placed on instruments used in legal metrology?
- Which tolerance requirements should my balances comply with?
- What are meaningful minimum sample weights or the starting points of operating ranges?
- What do I need to consider to meet the requirements of auditors on balances?

Users in pharmaceutical laboratories, for example, encounter these and other questions in their daily work with laboratory balances. In many laboratories, weighing is one of the most frequent, critical and time-consuming tasks.

Although weighing is only one of many steps in most applications, potential errors can be propagated throughout the entire analytical chain and put quality, consumer safety and productivity at risk.

For this reason, the accuracy and reproducibility of weighing results are playing an increasingly important role, not only in the pharmaceutical and regulated industries. Ultimately, the trustworthiness of the measurement values determines whether laboratory results are accepted, intermediate products need to be rejected and whether final products can be released. Only reliable weighing results lead to correct decisions and allow processes to be carried out reproducibly.

Ever since the company was founded in 1870 and manufactured the world's first short-beam analytical balances, Sartorius balances have been known worldwide for their quality and reliability. In the 150 years of the Sartorius Group's history, the company not only has accumulated the most comprehensive technological experience, but has also been involved for many decades in national and international committees and working groups, thus playing a significant part in drafting and defining metrological regulations, guidelines and standards. Beyond this, in many countries Sartorius operates ISO/IEC 17025 and ISO/IEC 17020 accredited calibration laboratories and inspection bodies that permit the company to issue accredited calibration certificates and perform legal metrology activities.

With a series of white papers that will gradually be compiled into a Best Practice Guide: Lab Weighing, Sartorius aims to answer the most important metrological questions and issues revolving around the subject of weighing in the laboratory under practical aspects.

## **The Correct Way to Use Laboratory Balances and to Handle Samples**

Today, lab balances have been perfected to such an extent that the smallest sample quantities can be weighed quickly, easily and with highly reliable results. Yet weighing still remains a critical process that is influenced by the ambient conditions at the location of installation, laboratory personnel, and by other physical effects. The most important influence factors that can affect weighing results as well as the basic rules for using laboratory balances are provided in the Sartorius White Paper on the Correct Way to Use Laboratory Balances and to Handle Samples (1).

## **Calibration**

A decisive factor for ensuring the reliability and acceptance of measurement results is calibration of all measuring and test equipment. Besides routine testing by the user, traceable calibration plays a crucial role in quality management systems. Several Sartorius white papers describe the correct choice of test and calibration intervals (2), the advantages of calibration by an ISO/IEC 17025 accredited laboratory (3), practical interpretation of the calibration result (4), the subject of measurement uncertainty, and the Euramet Guidelines on the Calibration of Non-Automatic Weighing Instruments (Euramet cg-18) (5). In addition, a further Sartorius white paper on test reports describes how balances are tested in comparison to manufacturer or customer tolerances (6).

## **Test Equipment**

Apart from how to choose suitable calibration intervals, selecting and handling test weights used in calibration have repeatedly raised many question marks, which are likewise answered in a Sartorius white paper (7).

## **Regulatory Requirements**

In many applications, laboratory balances are subject to compliance with further requirements, such as those in legal metrology or those stipulated by pharmacopeias. Several Sartorius white papers explain these requirements, such as those based on legal metrology (8) and those stemming from the United States Pharmacopeia (USP) (9). As the subject of minimum sample weight repeatedly plays a role in the various regulations, Sartorius provides a separate white paper describing and contrasting the various concepts for minimum weight (10).

## Glossary

This collection of white papers is supplemented by a glossary (11) that explains the most important terms used in weighing and metrology.

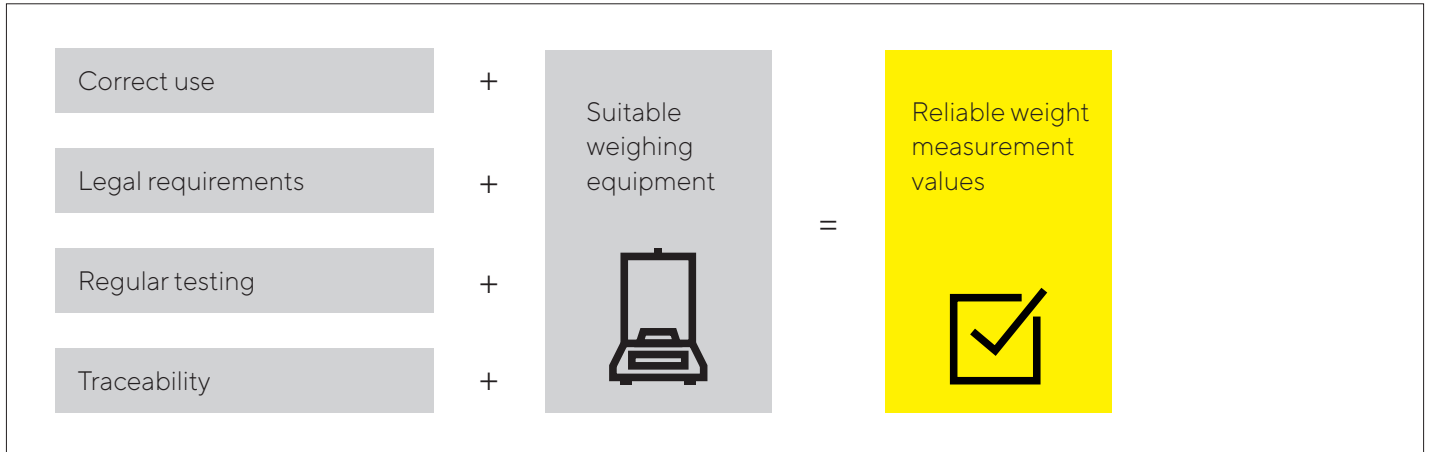


Figure 1: Diagram showing the prerequisites that need to be met to obtain reliable weight measurement values.

## Literature

1. Sartorius White Paper: Reliable Weighing Results, (The Correct Way to Use Laboratory Balances and to Handle Samples), 2020.
2. Sartorius White Paper: Test Intervals and Tolerances (How are test intervals and tolerances defined in a practical and risk-based manner?), 2020 (planned publication).
3. Sartorius White Paper: Calibration Certificates Issued by Accredited Service Providers (What advantage does our accreditation offer to users?), 2020 (planned publication).
4. Sartorius White Paper: Calibration Certificate According to EURAMET cg-18 (Understanding calibration certificates and applying the results in practice), 2020 (planned publication).
5. Sartorius White Paper: EURAMET cg-18 Guidelines on the Calibration of Non-Automatic Weighing Instruments Guidelines (Requirements, options and implementation of these guidelines by Sartorius), 2020 (planned publication).
6. Sartorius White Paper: The Sartorius Test Report for Balances (Tests comparing weighing results to manufacturer or customer tolerances), 2020 (planned publication).
7. Sartorius White Paper: Handling Test Weights (Meaningful selection and correct handling of weights), 2020 (planned publication).
8. Sartorius White Paper: Weighing in Legal Metrology (Use and testing of laboratory balances in legally regulated environments), 2020.
9. Sartorius White Paper: Weighing in Regulated Pharmaceutical Environments (Chapters 41 and 1251 of the U.S. Pharmacopeia and Chapter 2.1.7 of the EU Pharmacopeia), 2020 (planned publication).
10. Sartorius White Paper: Minimum Weights According to USP <41>, OIML R76 and EURAMET cg-18 (How high does a minimum sample weight need to be to obtain reliable weighing results?), 2020.
11. Sartorius White Paper: Glossary and Terminology (Weighing terms briefly explained), 2020 (planned publication).


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