

Laboratory Products

Proven Cleaning Procedures For Lab Balances and Safety Cabinets

METTLER TOLEDO

Cleaning a balance and the surrounding work area is important to ensure operator safety and long equipment life.

To protect users when weighing potentially harmful or active pharmaceutical substances, balances are often installed and used in safety cabinets. To maintain safety and avoid cross- contamination, it is essential to adopt effective cleaning measures.

This article contains helpful information on cleaning methods and agents and gives instructions how to clean a balance and the surrounding safety-cabinet area. It also provides solutions for keeping your balance clean in the first place.

Introduction

If you work in a laboratory, then you know that keeping a balance and the surrounding safety-cabinet area clean is important. Appropriate cleaning procedures:

- Minimise cross-contamination risk.
- Minimise undesired microbiological contamination.
- Enhance user safety.
- Increase operating reliability.
- Ensure accessibility for service maintenance.
- Reduce equipment failure rates.

If you do not have sufficient cleaning SOPs, these points can represent a significant source of expense for your lab, whether in rework, health costs, or equipment service and replacement costs. Keeping balances and surrounding work areas clean is a great first step towards keeping these kinds of costs in check.

This article will cover all aspects of balance cleaning including:

- How to clean various balance components.
- How to clean internal safety-bench surfaces.
- Which cleaning agents are appropriate.
- How to avoid making your balance dirty.
- How intelligent solutions eliminate spills altogether.

Most recommendations in this paper apply to balances and safety benches made by any manufacturer. Some specifics of Mettler-Toledo equipment will also be covered. When in doubt, the manual that came with your balance or safety enclosure is the place to start for information on cleaning and maintenance.

Essentially, cleaning can be quick and easy with appropriate methods and know-how.

Definitions

Cleaning: Physical removal of foreign material, e.g. dust, soil or organic material such as secretions, excretions and microorganisms. Cleaning generally removes rather than kills microorganisms. It is accomplished with water, detergents and mechanical action.

Decontamination: Removal of microorganisms, radioactive substances or hazardous material to leave an item safe for further handling.

Disinfection: Inactivation of disease producing microorganisms. Disinfection does not destroy bacterial spores. Disinfectants are used on inanimate objects in contrast to antiseptics, which are used on living tissue. Disinfection usually involves chemicals, heat or ultraviolet light. The nature of chemical disinfection varies with the type of product used.

Sterilisation: Destruction of all forms of microbial life including bacteria, viruses, spores and fungi. Ideally, items are cleaned first so that effective sterilisation can take place.

Cleaning Agents and Tools

Depending on the laboratory, different risks and potential for contamination exist. In chemical and pharmaceutical laboratories, primary risks include the potential for exposure to harmful chemicals or active substances, either by inhalation, ingestion, or direct contact.

In biological laboratories, risks also include the potential for exposure to microorganisms that could result in infection and illness. The level of potential exposure to biological contaminants will in part determine the type of cleaning agent chosen. For example, an analytical laboratory primarily working with chemical agents might prefer 70% isopropanol, while a biochemical laboratory would use 70% ethanol to reduce contamination.

Secondarily, the cleaning agent selected must be able to fully remove contamination yet not damage the equipment.

Balances should always be cleaned after weighing potentially toxic reagents. Cleaning the surrounding safety cabinet should always follow a plan. At best, this is a cleaning and disinfection procedure. These procedures should be accessible and visible for all concerned operators. A telescopic mop, as shown in *Figure 1*, is the right tool for cleaning the interior of the safety cabinet.

Regardless of whether you are cleaning the balance, the safety cabinet, or both, always wear personal protective equipment (PPE). If you are entering the working chamber of a safety bench, this includes safety glasses, FFP3-breathing protection and headwear as well as protection of the upper body (such as a hooded overall).



Figure 1: An operator using a telescopic mop.

The Right Time to Clean

Laboratories differ on how often equipment should be cleaned depending on industry, application, frequency of use, and process risk. This risk depends on an internal assessment. Generally, the assessment factors in issues such as how much damage a wrong result will have on the analysis as well as how dangerous or toxic substances in use are. SOPs will generally reflect this risk and specify the frequency of balance and safety-cabinet cleaning.

Recommended Cleaning Frequency for Balances

As a general rule the balance should be cleaned immediately after every use or change of weighing substance.

Every user expects that the previous user has left the instrument clean. However, control is always better than trust. Therefore, before you start work, inspect the instrument in front of you. If the balance is obviously soiled, then immediate cleaning prior to use is required.

When handling potentially toxic substances, the balance must always be cleaned immediately after use. This avoids cross-contamination and exposure risk for the person who uses the instrument next.

Recommended Cleaning Frequency for Safety Benches

A daily moist-wipe disinfection of the work area before or after work, especially if a spill or other contamination has occurred, is recommended. In cytostatic benches, it is common to disinfect before and after each batch production. A thorough cleaning should be executed at least once a week or whenever contamination such as a spill has occurred. Clean and disinfect all surfaces including the front windows, back and sidewalls/windows, and the work surface itself.

Standard Balance and Safety-Bench Cleaning Procedures

General cleaning procedures follow for both balances and safety cabinets / benches. Please consult your balance or safety-cabinet manual for exact procedures based on the models in use in your lab. Any unique procedures required by the nature of your process or weighed substances should always be followed.

Balance cleaning procedure

The balance display must be switched off, unplugging the power is recommended but not necessary. If possible, leave the balance in its normal operating position. Do not tilt it sideways and don't unplug connected peripherals.

Make a preliminary sweep of the area around the balance using an appropriate alkaline agent and a wipe to help avoid further contamination. Disassemble all removable parts.

Use a lint-free cloth moistened with a mild cleaning agent to clean and remove any material spilled on balance surfaces. First remove powder and dust, then sticky substances.

- For removal of powder or dust use a disposable tissue. Never blow; this could transport the dirt inside the balance or into the safety cabinet.
- For removal of sticky substances use a damp, lint-free cloth and mild solvent (isopropanol or ethanol 70%); avoid abrasive materials.
- Wipe away from the hole in the middle of the balance. Do not allow any substance to enter the balance's internal parts and do not spray or pour liquids on the balance. This might lead to damage of the weighing cell or other essential balance components.

Use a damp cloth or tissue for the removable parts and clean with a mild cleaning agent containing ethanol (e.g. a commercial window cleaner), or simply place them in the dishwasher.

Follow procedures to thoroughly clean surfaces in the safety cabinet.

To reassemble the balance Make sure the parts are correctly positioned, switch the balance on and check that it is working correctly. If completely switched off: Ensure enough warm-up time before first use.

To ensure the balance is ready check that the balance is levelled or take appropriate action to level if it is not. Calibrate with external weights or execute an internal adjustment such as FACT. Place a test weight on the weighing pan and perform a routine test to check accuracy. Test accessories (e.g. make a test printout for printers).

Safety-cabinet Cleaning Procedure

When cleaning toxic or hazardous substances, don't forget to wear your PPE.

Do not touch or damage installed air filters. They are usually made from glass fibre and are very sensitive. Be aware that wipes can be sucked in air inlet grids. If any wipes become trapped, be careful, they could be contaminated.

Always consider the necessary reaction and drying times of cleaning agents and allow cleaning agents to dry before next use.

Generally, safety benches open on hinges for access to the working chamber. Always open and clean them carefully. Never clean them when they are positioned directly over your head to avoid injury should the hinges give way.

To clean the safety cabinet keep the safety bench in running mode. Spray the disinfection agent only onto a wipe. Never spray it directly on any surface. Wipe down the internal area with a cleaning agent (e.g. 0.1-molar sodium hydroxide solution) as a preclean, especially for cytostatic safety benches. Lift single working plates one by one to clean and disinfect all edges and undersides. Clean the drip tray too. Don't remove plates from the working chamber until they are properly cleaned and disinfected.

For disinfection, repeat the steps with a wet wipe of disinfectant, e.g. 70% isopropanol.

To clean and disinfect the external shell, use a neutral or even alkaline cleaner. Prior to cleaning, pretest your cleaner on a hidden surface area and check any resulting reaction. Never use solvents.

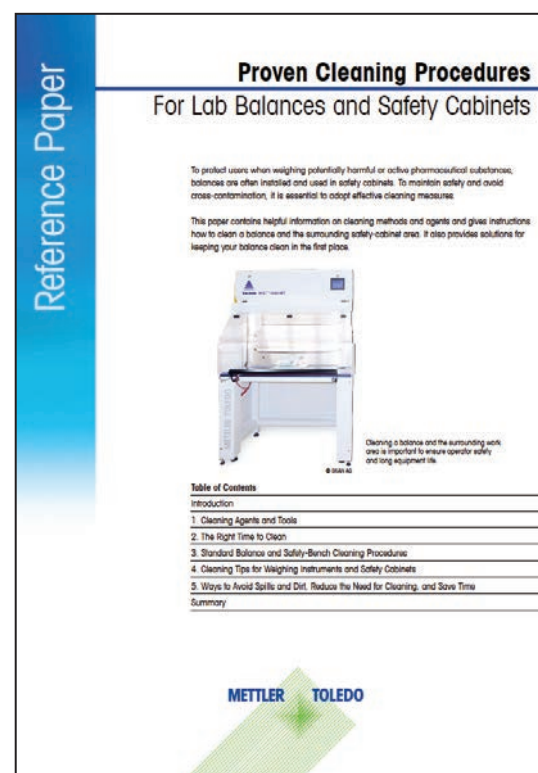


Figure 2: Mettler-Toledo's reference paper offers detailed information on cleaning procedures for balances and safety cabinets.

Cleaning tips for weighing instruments and safety cabinets

Always wipe with slow moves. At first in lines from the top, down on vertical surfaces. Please ensure a small overlap with each stroke to attend to the entire surface area. On horizontal work surfaces, always wipe in lines from the rear to the front, being sure to overlap with each stroke to cover all surface area in a manner similar to the one used for vertical surfaces.

Always wipe with the edge of your hand After each draw, please turn the wipe. When doing so, remember which parts of the wipe are used and don't reuse sides. Use a fresh wipe, moistened, when all sides have been used.

Don't forget to clean and moisten all edges and corners of working surfaces, including the drip tray and external surfaces if required.

A balance that allows touchless operation - achieved through a built-in functionality, an optical hand-sensor, or addition of a foot switch - can help prevent soiling. This can be especially helpful when working with toxic substances.

A balance that allows you to detach the balance terminal and move it away from the weighing platform can also help avoid contamination, as can the use of a secondary display or display stand.



Figure 3: Wipe-down cleaning technique.

Finally, if possible, use fewer cables, as these offer an excellent way to trap undesirable dirt and dust around the weighing unit. Bluetooth may be a better option for data transfer in areas where cleanliness is of utmost importance.



Figure 4: Operate the balance without touching it. Add an optical hand-sensor configured to open the draft shield door, tare or print results with a wave of your hand.

Protecting the balance in-use

Replaceable protective covers and mats safeguard your balance from soiling while in use. They also help to prevent scratches and ensure a long instrument lifetime.

Exchangeable protective covers add an additional layer of protection for the balance. Safeguarding the balance from dirt and hazardous or sticky substances, they can be easily thrown away and replaced when soiled. The protective covers help to protect either the touchscreen and the terminal, the weighing pan or the whole balance from spills or dust without interfering with balance operation.

Create a safe dosing experience

Sample and standard preparation require substance transfer from the original container to the preparation. All material transfers bear a risk of spills and the need for cleaning. To help minimise this risk and avoid scattering during transfer, simplify dosing of powdery substances into flasks with the Mettler-Toledo SmartPrep weighing funnel and say goodbye to traditional weighing paper.

The disposable funnel is a single-use consumable used to weigh-in powders prior to volumetric sample preparation. Thanks to its antistatic material, powder is not scattered during weigh-in nor is it scattered during transfer to the flask since the funnel fits most flask sizes. The substance can be rinsed directly into the flask.

One-step dosing directly into the tare container reduces transfer steps, eliminates errors and substantially reduces contamination risk. Mettler-Toledo has designed various ErgoClip holders for many different applications and tare containers.

These can be used to support direct transfer of samples into volumetric flasks, vials, tubes, titration beakers and filters. ErgoClip holders fit all XPR and XSR analytical balances with a SmartGrid weighing pan.

When working with toxic substances, the cleaning might be insufficient and the affected area or weighing instrument must be decontaminated to eliminate operator exposure. Mettler-Toledo has developed automated powder dispensing. The substance is contained in the dosing head, completely eliminating operator contact with the dosed substance.

Protect the balance when it is not in use

They may be simple, but they work: Dust covers are excellent barriers against environmental contaminants such as dust and moisture. They also protect against accidental soiling or spills. All covers from Mettler-Toledo are designed to be chemically resistant and easy to place and remove.

Summary

Cleaning a balance and the surrounding safety-cabinet area is important to ensure accurate results and promote long equipment life. It also has a direct impact on operator safety or desired microbiological cleanliness.



Figure 5: ErgoClip holders stabilise the tare container in the XPR and XSR analytical balance to enable one-step direct dosing and eliminate sample-transfer errors and scattering.

Cleaning can be easy with an understanding of methods and cleaning agents. Under aseptic conditions or with highly active pharmaceutical substances, it can be useful to regularly validate the surface cleaning results. With a systematic approach, it is easier to improve the procedures or the applied cleaning and disinfection substances.

Ideally, laboratory SOPs dictate the schedule for equipment cleaning. After weighing, make sure the balance and surrounding safety-cabinet area is clean for the next operator to prevent cross-contamination. Thorough cleaning is mandatory, especially after weighing potentially toxic substances, to prevent exposure risk.



Figure 6: Covers provide protection from dust and moisture when balances are not in use.

Use standard laboratory PPE during cleaning. Turn off balances before cleaning but keep the safety cabinet in running mode. Use a tissue or telescopic mop to clean the surrounding safety-bench area. Adopting effective wiping techniques will help you to achieve better results.

Dismantle the draft shield and either wipe the glass panes clean or place them in the dishwasher. Clean the balance using a moistened cloth and the mildest cleaning agent that will completely remove the substance. A list of suitable cleaning and disinfecting agents can be found here: www.mt.com/lab-cleaning-guide.

It is critical to wipe any dirt or liquids away from the centre hole of the balance underneath the weighing pan. No substances should be allowed to fall or flow into the weighing cell. Additionally, to ensure accurate ongoing operation, balances should always be levelled and adjusted (e.g. FACT) after cleaning.

Certain solutions help you avoid spillage during weighing. Anti-static SmartPrep funnels avoid spills and make substance transfer easy. Grid weighing pans (SmartGrid and SmartPan) allow substances to fall into the tray so they do not disrupt weighing. ErgoClip holders allow direct one-step dosing into the designated tare container. Or, you can upgrade your analytical balance with a powder dosing module to secure your powders and dose directly into tare containers.

Above all, a clean balance and safety-cabinet enclosure protects you from cross-contamination and ensures that you and your team are not exposed to potentially harmful substances, making weighing safer for your entire laboratory.

For more information, visit: www.mt.com/lab-cleaning

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