

User Guide:

Cleaning & inspection of pipettes.



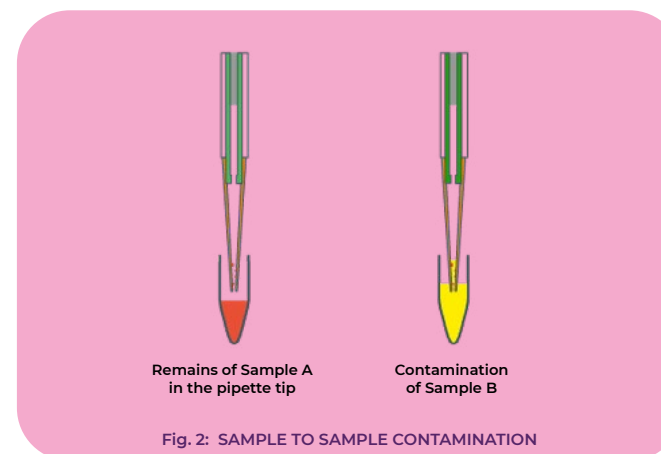
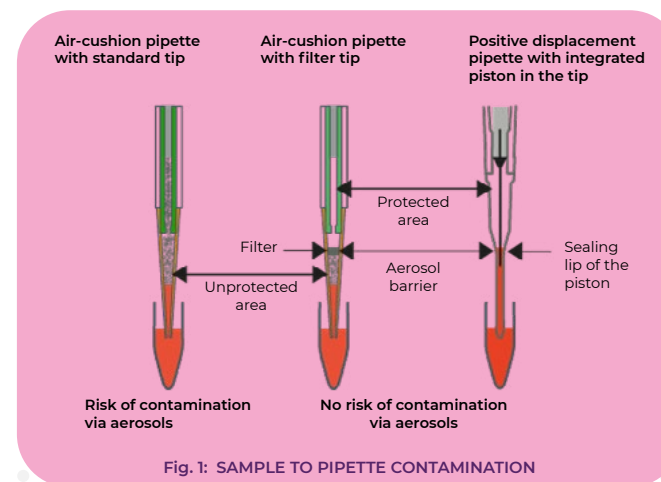
Decontamination & cleaning.

Quality management in the laboratory calls for regular cleaning and inspection of pipettes. How often a pipette needs to be cleaned and inspected is risk based, depending on the frequency of use, the number of people who use the pipette, the type and aggressiveness of the liquids being dispensed, and the acceptable maximum permissible error specified by the user.

SOURCES OF CONTAMINATION & PREVENTION

SOURCE	REASON	PREVENTION
Pipette to sample	This results from using a contaminated pipette or non-certified pipette tips.	Regularly clean or autoclave your pipette. Use good quality certified or sterile pipette tips.
Sample to pipette	When the sample, or its aerosols, enter the pipette.	Hold the pipette vertically and move the control button slowly upwards during aspiration. Filter tips offer the most effective way to avoid contamination as they prevent aerosols from entering, and contaminating, the pipette. Immediately ejecting the pipette tip after use to prevent vapors from entering the pipette is also recommended, as well as storing the pipette suspended in a pipette stand. Using positive displacement pipettes with tips that feature a piston with integrated sealing lip can also prevent contamination (Fig. 1).
Sample to sample	When frequently pipetting concentrated bases, it is advised to occasionally rinse the lower part of the pipette with distilled water. The use of filter tips is also recommended.	The plastics used in ErgoOne® pipettes, and the ceramic pistons, are resistant to bases. However, aerosols from the bases may enter the lower part and negatively affect the performance of the pipette. Clean as described in "Aqueous solutions".

Table. 1: Sources of contamination & prevention



DECONTAMINATION AND CLEANING

EXTERNAL CLEANING

Pipettes should be checked every day for external contamination. It is particularly important to ensure the tip holder is clean and undamaged.

External contamination can be removed using a non-corrosive surface disinfectant such as Chemgene MEDLAB, a mild detergent, or 60% isopropanol. Spray or wipe the handle, volumeter, tip holder and tip ejector, rinse with distilled water and allow to dry. UV-resistant pipettes, such as Starlab's ErgoOne®, can also be placed under UV light, if necessary.

INTERNAL CLEANING

Regular checking of the pistons, springs, seals and tip holder is recommended. Internal cleaning can be carried out using a non-corrosive surface disinfectant such as Chemgene MEDLAB (1:10), a mild detergent or 60% isopropanol. Pipettes requiring full decontamination can be dismantled and cleaned thus:

- Use a container deep enough to immerse the parts completely. (NOTE: Electronic pipettes must not be submerged in any liquids)
- Dismantle the pipette (as specified by the manufacturer) and place only parts that can be immersed, eg tip holder, piston, tip ejector etc completely into the solution for 30 minutes
- Remove parts and rinse with de-mineralised water
- Lie on a lint-free cloth and place in a dry oven at max. 60 °C for at least one hour or until dry. Alternatively, place on the bench on a lint-free cloth and air dry for approximately 4 hours
- Reassemble the pipette following the manufacturer's instructions, lightly lubricating* the piston, if required. Incorrect reassembly may cause issues or damage to the pipette.

*Note for Starlab ErgoOne® pipettes: The ErgoOne® piston material is an innovative, wear-resistant plastic (piston material for red colour-coded models is stainless steel), that is treated with a special lubricant during manufacture so during normal use, it is not necessary to relubricate. In the event of frequent autoclaving however, more frequent relubrication is recommended. See User Manual for more info.



AUTOCLAVING

Many of today's pipettes can either be fully autoclaved, or dismantled and the lower parts autoclaved. Pipettes should be autoclaved according to the manufacturer's instructions. For sterility, a temperature of 121 °C for a period of at least 20 minutes is required.

When autoclaving a fully autoclavable pipette, open the pipette in the middle by 1–2 turns after removing the tip ejector sleeve to allow the vapor to enter more easily. After autoclaving, the pipette (or autoclaved parts) must be allowed to completely dry and cool down at ambient temperature. Warmed plastic parts may stretch or get damaged if screwed back together before they have cooled down completely. With Starlab's ErgoOne® pipettes, regreasing the piston is not required after autoclaving*.

UV DECONTAMINATION

UV-resistant pipettes, such as Starlab's ErgoOne® pipettes, can be left in laminar flow rooms or cabinets without any risk, as the UV light required for disinfection will have no adverse effect on the materials the pipette is made from, and subsequently, the performance of the pipette. When decontaminating pipettes with UV light, use a 30 Watt low-pressure mercury-vapor lamp with a characteristic wavelength of 254 nm. The optimum distance between the lamp and the pipette is 60 cm.

DECONTAMINATION AND CLEANING

The frequent use of highly volatile organic reagents can cause the sealing that is normally maintenance-free, to swell up and cause the pipette to become stiff. If this happens, remove the lower part of the pipette and let out the sealed air overnight.

Frequent pipetting of saturated solutions can lead to aerosols precipitating inside the pipette and the formation of crystals that destroy the seal. To avoid this, regular cleaning and regreasing of the piston as well as regular inspection of the piston seal is recommended.

SUBSTANCE CLASSIFICATION	HANDLING, SPECIAL FEATURES	DECONTAMINATION AND CLEANING
Aqueous solutions and buffers	The pipette is calibrated with distilled water and, thus, provides very high levels of accuracy.	Open the pipette, rinse contaminated parts with distilled water, allow to dry at max. 60 °C in a drying cabinet, then lightly grease the piston ¹ .
Inorganic acids	When frequently pipetting concentrated acids, it is advised to occasionally rinse the lower part of the pipette with distilled water.	The plastics used in ErgoOne® pipettes are resistant to acids, as are the ceramic pistons (except hydrofluoric acid). However, aerosols from the acids may enter the lower part and negatively affect the performance of the pipette. Clean as described in "Aqueous solutions".
Bases	When frequently pipetting concentrated bases, it is advised to occasionally rinse the lower part of the pipette with distilled water. The use of filter tips is also recommended.	The plastics used in ErgoOne® pipettes, and the ceramic pistons, are resistant to bases. However, aerosols from the bases may enter the lower part and negatively affect the performance of the pipette. Clean as described in "Aqueous solutions".
Potentially infectious liquids	The use of filter tips is recommended to avoid contamination. Alternatively, use a positive displacement system.	Autoclave (121 °C, 20 mins) the contaminated parts. ErgoOne® pipettes are fully autoclavable; to increase effectiveness, we recommend removing the tip ejector. Also loosen the tip holder by rotating it once (single-channel only); if required, also immerse the lower part in standard laboratory cleaning agents; then thoroughly rinse with distilled water and dry at max. 60 °C in a drying cabinet, then lightly grease the piston ¹ .
Sterile solutions (eg. in a cell culture)	Sterile filter tips are recommended so sterility is not compromised.	Proceed as described above in "Potentially infectious liquids".
Organic solvents	1. The density is different to that of water. Therefore, the pipette must be adjusted. 2. Rapid pipetting is recommended (due to the high vapor pressure and changed wetting behavior). 3. After completion of the pipetting process, open the pipette and allow the solvents to evaporate.	Allowing solvents to evaporate is normally sufficient for liquids with high vapor pressure. If not, open the pipette and immerse the contaminated parts in detergents, then rinse thoroughly with distilled water and allow to dry at max. 60 °C in a drying cabinet, then lightly grease the piston ¹ .
Radioactive liquids	Filter tips should be used to avoid contamination. Alternatively, use a positive displacement system.	Open the pipette and immerse parts in complex-forming liquids or special cleaning solutions. Afterwards, rinse thoroughly with distilled water and allow to dry at max. 60 °C in a drying cabinet, then lightly grease the piston ¹ .
Proteins / Nucleic acids	The use of filter tips is recommended to avoid contamination. Alternatively, use a positive displacement system.	Proteins: Open the pipette, wash off proteins with detergents, then rinse and allow to dry at max. 60 °C in a drying cabinet, then lightly grease the piston ¹ . Nucleic acids: Decontamination by boiling in glycine/HCl buffer (pH2) over 10 mins (this ensures that no more DNA can be detected on agarose gel). Afterwards, rinse thoroughly with distilled water and allow to dry as described; lightly grease the piston ¹ . Clean with sodium hypochlorite (5 %). Afterwards, rinse thoroughly with distilled water.

¹ If required: for ErgoOne® pipettes, regreasing of the piston is not generally required after autoclaving.

Table. 2: Decontamination and cleaning of air-cushion pipettes

Inspection of pipettes.

Precise and correct dispensing of samples and reagents is of key importance for both research and diagnostics applications. To ensure reliable results, your pipette, and any tools or equipment used for its inspection, should be checked at regular intervals to ensure it is functioning correctly. Regular inspection and care of your pipette should be part of your ongoing process to ensure your pipette delivers reliable results, from daily inspections through Quick Checks in-house to regular calibrations by a professional external provider. How often you carry out an inspection will depend on the frequency that the pipette is used, whether different people use the same pipette (you know how you treat the pipette, but can you vouch for your colleagues?) and the type of samples you are dispensing.

FUNCTION TEST

Pipettes should be visually checked for leaks, broken parts, air bubbles and contamination on a daily basis.

LEAK TEST

To perform a leak test, the nominal volume of a pipette is aspirated into the pipette tip (distilled degassed water) and the pipette is held vertically. The pipette, the pipette tip and the test liquid should have the same temperature. If a distinct drop has not formed at the tip after 10 to 15 seconds, the pipette is tight. (Note: the tip should always be pre-wetted.)

VOLUMETRIC TEST

Single or duplicate determinations of the volumes specified for the pipette should be carried out after relevant changes to the device (eg. new batch of pipette tips, exchange of volume-determining parts).

QUICK CHECK

Four measurements of each of the volumes specified for the pipette type should be carried out on a monthly basis to roughly determine random and systematic errors. You need to take into account the evaporation if checking small volumes; use the correction factor as this could be the difference between a pass/fail.

CALIBRATION

Calibration should be carried out by an external provider at least annually. More regular calibration should be determined by the risk, depending on the pipette's use and criticality of the results.



Calibration of pipettes.

WHAT IS CALIBRATION?

Calibrations are performed to determine the performance of the pipette against required specifications. Pipettes are precision instruments that contain small internal parts which, over time, are subject to wear and tear. These parts need to be kept in good condition so your pipette can perform accurately and precisely.

How often and to what specification your pipette is calibrated professionally should be risk based; the frequency the pipette is used, assay specification and your lab's own, internal Quality Control levels and/or compliance. Having pipettes maintained and calibrated at a regular interval is integral to the compliance of external regulatory guidance, such as:

- ISO 9001 Quality Management System
- ISO17025 General Requirements for the Competence of Testing & Calibration Laboratories
- ISO 15189 Medical Laboratories Requirements for Quality and competence
- ISO 13845 Medical Services Quality Management System
- FDA 21 CFR Part 820 Good Manufacturing Practice for Medical Devices

Depending on the type of laboratory / work for which the pipette is being used, the level of calibration required can differ too.

TYPES OF CALIBRATION

As Found Calibration checks the performance of your pipette prior to servicing or as part of your regular checks. No adjustment of the pipette is made; this is purely a statement of how the pipette is performing.

Service & Calibration is recommended for pipettes requiring a service (internal clean, inspection, leak test and worn parts replaced, plus an optional external clean), as well as a calibration.

Pre & Post Calibration comprises an As Found Calibration Certificate to show how your pipette has been performing, prior to a Service and a further calibration being carried out.

The **number of readings** and at which **points** on the pipette's volume range you choose (minimum, middle or maximum, or all three), may depend on when the pipette was last calibrated, and how stringent your lab's Quality Control level is in line with the work you perform.

DO I NEED AN ACCREDITED CALIBRATION?

Again, this will depend on the type of lab and the work being carried out, and is usually determined by your lab's own internal Quality Control levels and/or the need to comply with external regulatory guidance.

Starlab's calibration labs in the UK and Germany are accredited for UKAS calibration (Starlab UK) and the German Accreditation Body DAkkS (Starlab Germany). This means that either laboratory can perform calibrations to ISO17025, an internationally recognised standard which ensure full metrological and traceability of data.

For more information or advice on pipette calibration and servicing, please go to www.starlab.click/pipetteservicing

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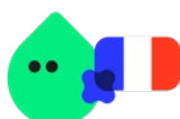
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