Top Tips for Pipette Maintenance

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A guide to keeping your pipettes & results accurate, precise and reliable

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Sartorius Liquid Handling Specialists – Helsinki Training September 2015

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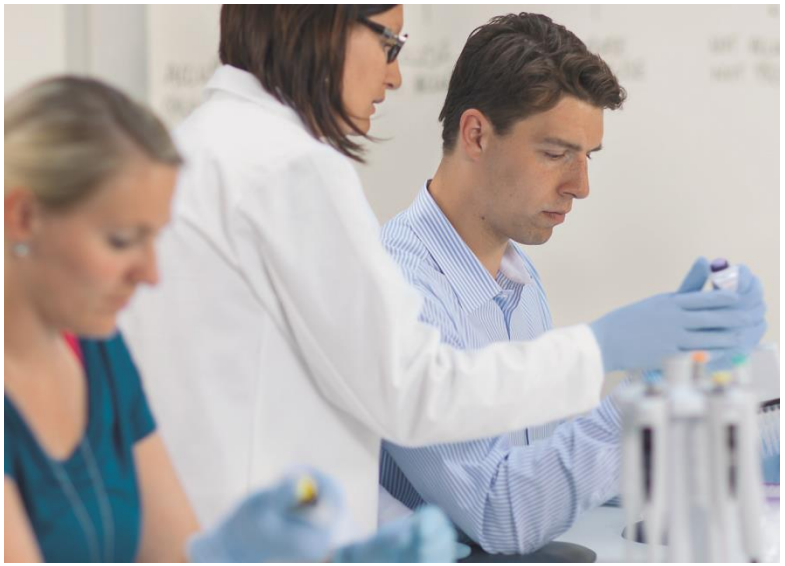
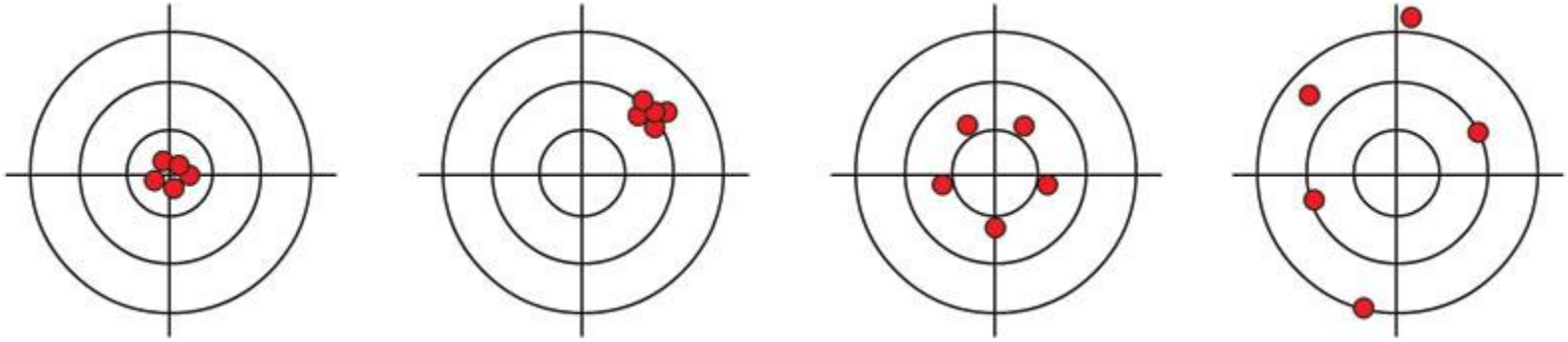


Accuracy and precision: pipette or user error?



1. Accurate Precise
2. Precise inaccurate
3. Accurate imprecise
4. Inaccurate imprecise

1 Neither

2 Incorrect pipetting technique, no Z Factor correction and/or over-winding

3 Worn piston/seal and/or internal contamination

4 All of the above!

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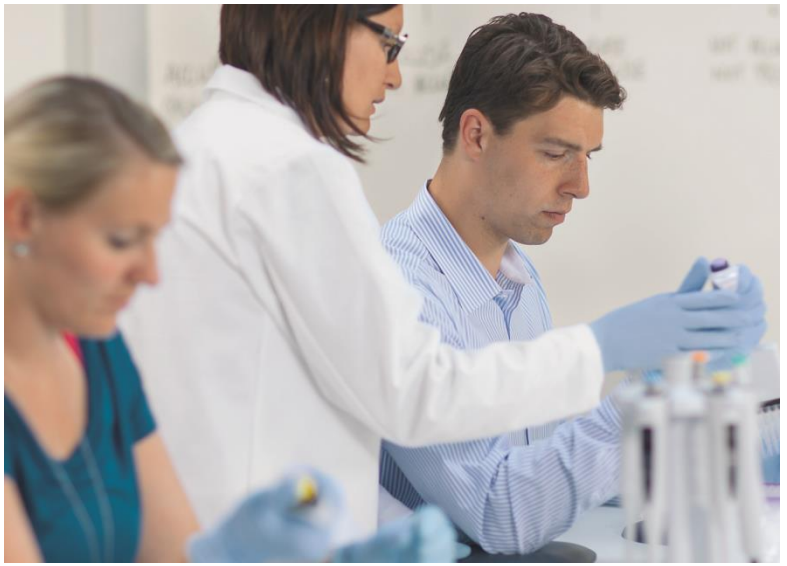

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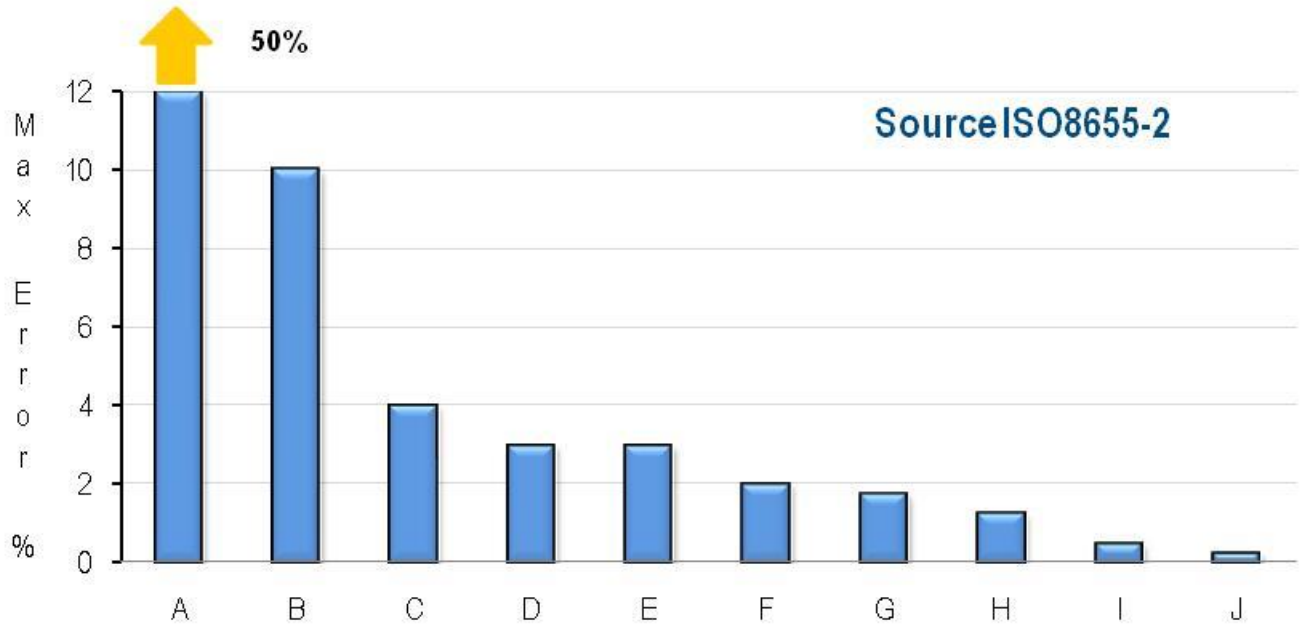
Pipette Design Overview

Main sources of pipetting errors



A. Leaky piston/tip-cone

B. Poor tip fitting

C. Reuse of tip

D. Failure to wipe pipette tip on vessel wall

E. Difference in humidity – Z Factor

F. No pre-rinsing/pre-wetting tip

G. Variable pipetting cycle time

H. Depth of tip and angle of pipetting

I. Variable pipetting speed

J. Difference in pipette, tip, liquid and room temperature

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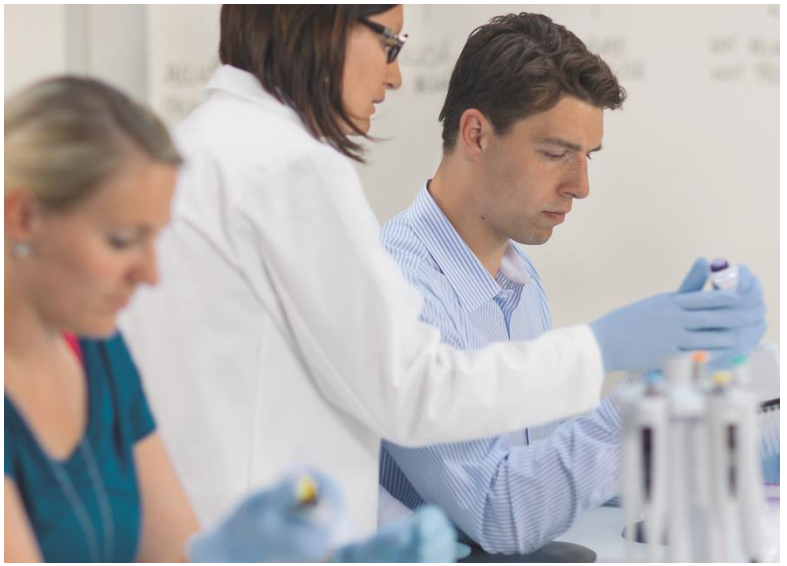

Preventative Maintenance:

- Pipettes are precision instruments
  - Containing high-precision mechanical (and electronic) parts
  - Parts are subject to wear, accidental damage & contamination
  - The functionality and condition has direct influence on pipetting results

- Regular checking and cleaning ensures
  - Accuracy and precision
  - Prolongs the pipettes lifetime
  - Reduces the risk of contamination

Preventative Maintenance: Cleaning & Decontamination

- **Outer surface**
  - Wipe the outer surface daily with Distel, Virusolve or equivalent (or 70% ethanol or 60% iso-propanol)
  - Wipe with soft lint-free cloth
- **Tip cones/tip holders**
  - Any damage or contamination may cause problems in tip sealing and might cause leakage – although the tip fits
  - Clean any visible contamination and check that there's no wear, usually a groove caused by poor-quality tips
- **Safe Cone filters**
  - Replace tip cone filters regularly daily or after 50 – 250 pipettings & immediately in case of over aspiration

Preventative Maintenance: Pipette Handling

Do:

- Ensure pipettes are serviced annually and checked at least 3 monthly
- Use racked tips if possible to minimise the risk of damaging the tip-cone(s)
- Eject tips using the tip-ejector button only – not with fingers
- Use pipette stands to keep pipettes vertical when not in use
- Adjust the volume from a slightly higher setting down to the desired volume and depress the plunger 2x - in case of wear in the mechanism

Preventative Maintenance: Pipette Handling

Don't:

- Disassemble the tip-cone or piston for cleaning – you will need to re-calibrate. Use autoclavable pipettes with tip-cone filters.
- Overwind beyond the volume range of the pipette
- Keep holding the pipette when not actually pipetting – as it warms the volume will change slightly
- Rock the pipette in any direction when loading tips from a rack – push downwards only
- Twist single channel pipettes when loading tips from a rack – can cause RSI
- Do not twist or push tips using excessive force when fitting to the tip cone(s) – if you have to do this - change the tip brand for a perfect fit

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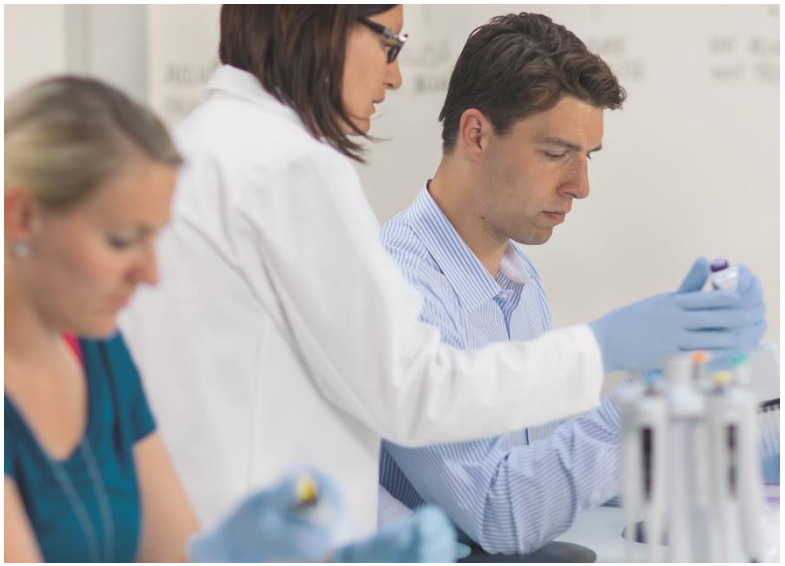

Maintenance and Repair: Top Tips 1

1.Clean the outer surface of the pipette with alcohol wipes, Distel® or Virusolve®

2.Inspect the pipette for damage: tip-holder & ejector, volume-lock/friction ring

3.Check the volume will adjust over the full range

4.Remove ejector & tip-holder & inspect piston, seals/o-rings

5.Always replace PTFE seals & o-rings on Gilson®-style pipettes

6.Spare parts & Preventative Maintenance Kits should always be available from the manufacturer. Before purchasing new pipettes – check they are and prices are reasonable

Maintenance and Repair: Top Tips 2

1.Grease the piston and/or seal if and as specified by the manufacturer with the correct grade of grease – essential for autoclavable pipettes

2.Reassemble pipette, adjust to the nominal (max) volume and check the plunger operates smoothly – to the 2nd stop

3.Check the systematic & random error at the nominal volume and 10% of the nominal volume with 4 readings minimum at each. A single point calibration is not recommended

4.ISO 8655 Maximum Permissible Errors is recommended – manufacturers' specifications are often challenging

5. Recalibrate the pipette if needed – ideally using a 5 decimal place balance & Z Factor correction

6.Apply a label to each pipette with the date & next scheduled calibration

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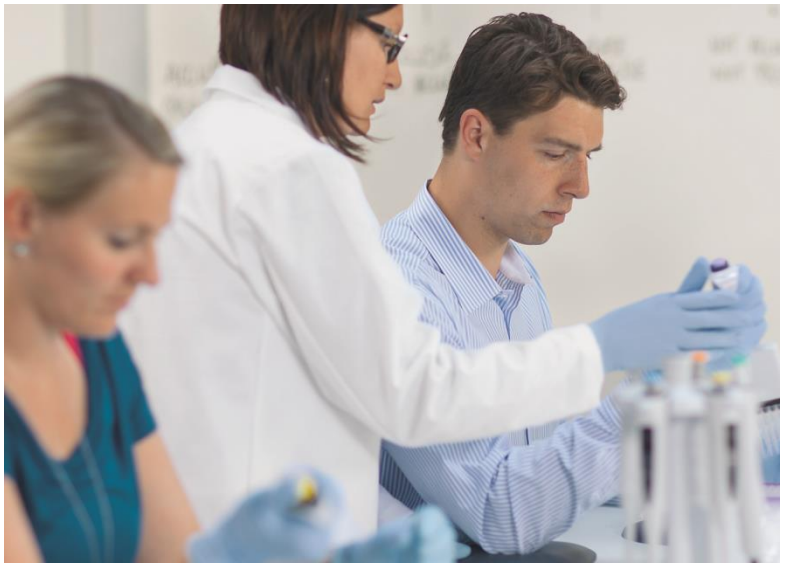

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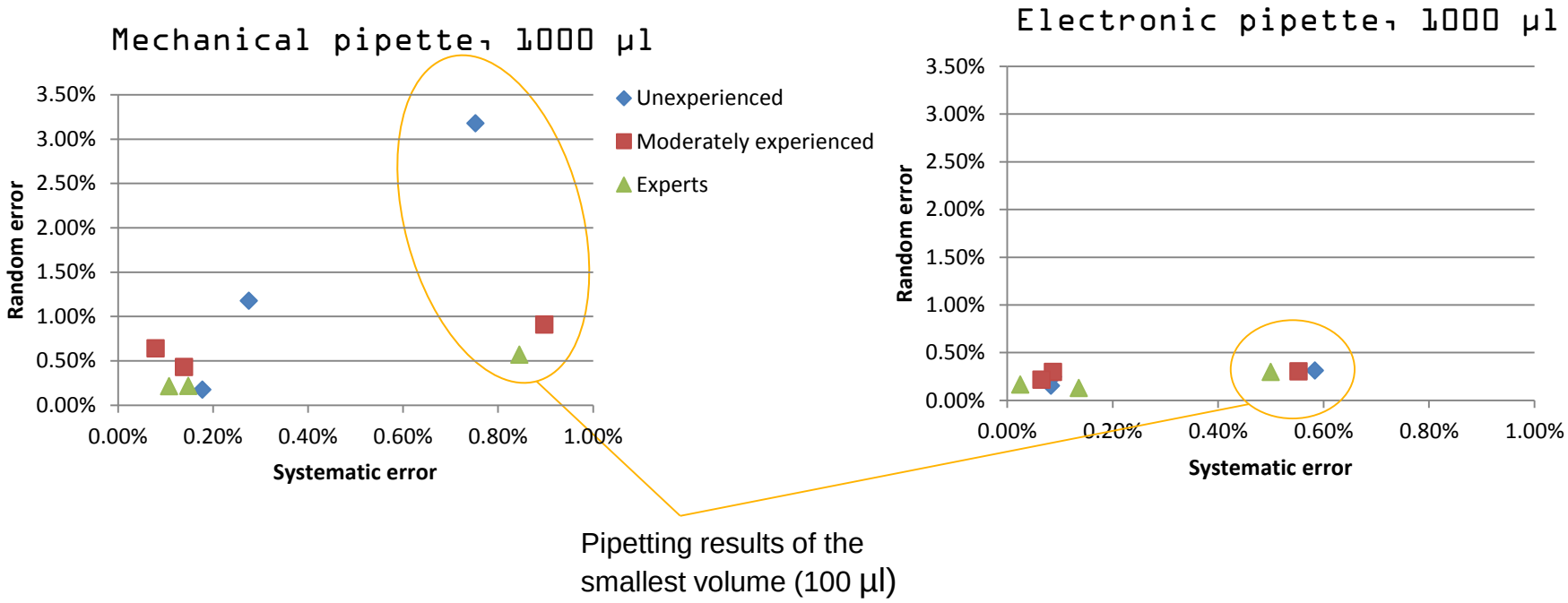
Pipetting Techniques (ISO 8655-2)- Summary

- PIPETTING SKILLS:
- Hold the pipette vertically when aspirating
- Immerse the tip 2-3mm under the liquid surface
- Pre-rinse 3-5 times before pipetting
- Pause consistently for 1 second minimum after aspiration
- Dispense at a 30-45° angle touching the receiving vessel wall & wipe upwards 10-15mm
- Be smooth and consistent -

PIPETTING PRINCIPLES & TECHNIQUES

- Choose forward or reverse pipetting as appropriate
- Use good quality pipette tips
- Minimise the air space inside the tip by using the pipette as near it's maximum volume as possible
- Minimise hand-warming effect by using the pipette stand

Pipetting skills and experience



Pipetting results of the smallest volume (100 µl)

Conclusion: Pipetting skills and experience have a bigger impact, when using a mechanical pipette compared to an electronic. With electronic pipettes the motor controls the piston movement consistently, with any user.

Pipetting Techniques -TOP TIPS

1. Reverse pipetting is a great way to deal with problem (viscous & foaming) liquids to ensure consitency
2. Electronic pipettes remove (almost) all user-related errors
3. Good tip fit is critical in ensure accurate results, the manufacturers brand is always best, regardles s of manufacturer!
4. Low retention tips are excellent at increasing sample recovery for viscous & foaming liquids
5. Filter tips are extremely effective in decreasing cross-contamination risks
6. RSI and Pipette ergonomics is a significant factor in results and user safety and comfort, ask for free trials before any pipette purchase!

Thank you very much for your attention!