

# Proper Pipetting Procedures

## Proper Air Displacement Pipetting

Conventional pipettes displace a cushion of air between the plunger and the liquid in the tip. For accurate pipetting, liquids must have physical properties similar to water:

- Density
- Viscosity
- Vapor Pressure (volatility)

### Hot tip!

For viscous or volatile liquids, use a positive displacement pipette, such as the BRAND Transferette™.



## Preparing the Pipette

- Attach a BRAND or other high quality pipette tip.
- Ensure the volume setting is correct.



The Transferette™ S features an innovative thumb-tip adjustment for fast, easy volume changes.



## Aspirating the Sample

- Press the pipetting button to the first stop.
- Hold the pipette vertically and immerse the tip 2 to 3mm into the liquid (1/8").
- Release pipetting button slowly and wait 1-2 seconds for level equilibration, and touch the tip against container wall before removing (ISO 8655 prescribes pre-wetting of the tip once prior to aspiration of a measured volume).



## Discharging the Sample

- Hold the pipette at a 30-45° angle against the wall of the container.
- Push the pipetting button to the first stop and hold.
- Push the pipetting button to the second stop (blow-out) while wiping the tip against the wall.
- Remove the pipette from the container, and release the button.



## Wetting the Tip

- Hold the pipette shaft over a suitable disposal container and press the tip-ejection key to the stop.



Get to know the BRAND family of pipettes at [www.brandtech.com](http://www.brandtech.com).

Transferette™ S and Transferette™ electronic



Simple service, Easy Calibration™!

PLT™ Pipette Leak Tester



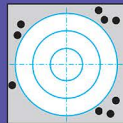
## Accuracy and Precision

**Calibration** is the process of determining the performance of an instrument without mechanical or electronic adjustment.

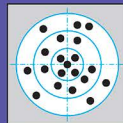
**Adjustment** is the manipulation of the instrument post-calibration so that the instrument is aligned within the specified tolerances.

**Accuracy** of measurement is how close the result comes to the target value.

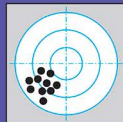
**Precision** (reproducibility) describes how closely grouped results are in a set of measurements, in units of volume.



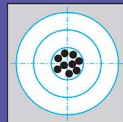
Inaccurate and imprecise



Accurate but imprecise



Inaccurate



Accurate

## Calibration Calculations

**Mean Volume** is calculated gravimetrically, then converting the weight to volume with a "Z-factor" compensating for temperature/density, pressure and buoyancy, per ISO 8655.

$$\text{Mean value } \bar{x} = \frac{\sum x_i}{n} \quad \begin{array}{l} x_i = \text{results of weighings} \\ n = \text{number of weighings} \end{array}$$

$$\text{Mean volume } \bar{V} = \bar{x} \cdot Z$$

Z = correction factor  
(e.g. 1.0029 µL/mg at 20°C, 1013 hPa)

Find a table of Z factors for typical ambient temperatures in the SOP manuals for BRAND pipettes. Or, consider EasyCal™ software to perform these calculations for you, and document

**Accuracy** is defined as the difference between the measured mean volume and the specified volume, measured as a percentage of the specified volume.

### Accuracy

$$A\% = \frac{\bar{V} - V_s}{V_s} \cdot 100 \quad V_s = \text{nominal volume}$$

**Precision or Coefficient of Variation (CV%)** is defined as the standard deviation of a set of measurements, measured as a percentage of the mean volume.

### Standard deviation

### Coefficient of variation

$$s = Z \cdot \frac{\sum (x_i - \bar{x})^2}{n} \quad CV\% = \frac{s}{\bar{x}} \cdot 100$$