

	Standard Operating Procedure Use of a Mechanical Pipette	SOP Number D-806	Revision 1
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1.0 Purpose

The purpose of this procedure is to describe the proper use of mechanical pipettes in the QC Laboratory along with instructions on how to ensure the mechanical pipette is functioning properly prior to use.

2.0 Scope

This procedure provides specific instructions for use of all mechanical pipettes in the QC Laboratory.

3.0 Responsibility

- 3.1 QC Laboratory personnel are responsible for the application and compliance of this procedure.
- 3.2 QC Laboratory Management is responsible for the execution of and compliance to this procedure.
- 3.3 QC Laboratory Management is responsible for keeping this procedure current with latest Ion Labs practices.

4.0 Definitions

- 4.1 **QC** – Quality Control
- 4.2 **Mechanical Pipette** – laboratory tool used to transfer a precise and accurate volume of liquid. Mechanical pipettes are typically used when a low volume of liquid is transferred, usually at the μl level. These pipettes are offered in various volume sizes, both fixed and adjustable.

- 4.3 **Positive Displacement Pipette** - used to accurately pipette very viscous, volatile, hot or cold, or corrosive samples. Pipette tips for these pipettes contain a piston to aid in volume transfer.

5.0 References

N/A

6.0 Procedure

Note: a mechanical pipette should be used when a small volume of liquid is to be transferred (less than 2mL), the liquid is viscous, or the liquid is corrosive.

6.1 Use of Mechanical Pipette

6.1.1 Selecting a mechanical pipette should consider the following:

6.1.1.1 Volume of liquid to be transferred

6.1.1.2 Composition of liquid to be transferred

6.1.1.3 The calibrated range of the pipette

6.1.2 Choose appropriate pipette tip for the mechanical pipette and attach.

6.1.3 If variable volume pipette, set to the volume amount to be transferred. If fixed volume pipette this step is not necessary.

6.1.4 Depress the plunger.

6.1.5 Pre-wet tip by immersing the tip to the correct depth, which can vary by the pipette and tip, and smoothly let the plunger go to its resting position.

6.1.6 Wait about one second for the liquid to flow into the tip. Discard liquid.

6.1.7 Repeat steps 6.1.5-6.1.6 with the exception of discarding liquid. Place the pipette—held at 10–45 degrees—against the wall of the receiving chamber, and smoothly depress the plunger to the first stop.

6.1.8 Wait one second and then depress the plunger to the second stop.

6.1.9 Slide the tip up the vessel wall to remove the pipette.

6.1.10 Allow the plunger to return to its rest position.

6.1.11 If transfer complete, eject tip from pipette.

Note: Do **NOT** allow any mechanical pipette to lay on its side with a previously used attached tip. Doing this will allow any residual liquid to potentially contaminate the inside mechanics of the pipette, causing corrosion and/ or damage to the pipette.

6.2 Weekly pipette check

6.2.1 Each pipette requires an at time of use check performed weekly prior to its use.

6.2.2 Results will be documented in a laboratory notebook for each pipette evaluated.

6.2.3 Materials needed: Balance, DI Water, thermometer, pipette and pipette tips.

6.2.4 At Time of Use Evaluation:

6.2.4.1 Leak Test (Step 1)

- Pre-wet tip as outlined in section 6.1.5.
- Using the same tip, aspirate the nominal volume.
- With the full tip immersed approximately 2mm in liquid, hold pipette vertically for 30 seconds.

- If liquid level does not drop proceed with step 2. If liquid level drops, a leak is indicated and the pipette may require repair and/or service.

6.2.4.2 Gravimetric Measurement (Step 2)

- Acclimate DI Water and all supplies to room temperature.
- Measure temperature of DI Water and record.
- Place receiving container on balance and tare. For a more accurate assessment, receiving container should be tared already containing some DI Water.
- Perform measurements at 100% and 10% of pipette volume capacity. Transfer quantity of liquid to receiving container and weigh, making sure to pre-wet tip as described in section 6.1.5. Ensure to dispense along the inner container wall and finish by drawing the tip end along wall to remove residual liquid. Record weight in logbook. Repeat for a total of five measurements.
- Convert weight to volume using density as outlined in Table 1.
- Values observed should be evaluated against allowable deviation as outlined in Table 2. In notebook indicate a pass or fail for each pipette evaluated.
- If at any time a mechanical pipette does not meet the criteria outlined in Table 2, the pipette should be removed from service and replaced or sent out for repair.

Table 1. Temperature Dependence of the Density of Water

Temperature °C	Density g/mL	Temperature °C	Density g/mL	Temperature °C	Density g/mL
0	0.99987	18	0.99862	38	0.99299
3.98	1.00000	20	0.99823	40	0.99224
5	0.99999	25	0.99707	45	0.99025
10	0.99973	30	0.99567	50	0.98807
15	0.99913	35	0.99406	55	0.98573

Table 2. Maximum Permissible Deviation

Nominal Volume (µL)	Low (10% of Volume) ± %	High (100% of Volume) ± %
1-1000	8	0.8
1001-10,000	6	0.6

6.3 Example: If evaluating a 1000µL pipette, the below conditions must be met:

6.3.1 Acceptable Range for 100µL: 92-108µL

6.3.2 Acceptable Range for 1000µL: 992-1008µL

7.0 Calibration

7.1 Mechanical pipettes should be calibrated every 6 months.

7.2 Calibration should include cleaning, precision, and accuracy evaluation. Evaluations are typically performed “as found” and “as left” so that confirmation of pipette performance as found can be demonstrated.

7.3 If the mechanical pipette fails evaluation “as found” then an investigation into its use may need to occur and any potential impact assessment performed. The weekly pipette checks as described in section 6.2 should capture any potential failures in real time.

8.0 Revision History

Revision	Date	Description of Changes	CCR #	By
0	06/15/21	New	N/A	J. Sassman
1	10/17/22	Revised allowable ranges, adopted calibration limits. Minor edits.	CC-22-0411	J. Sassman