

Chapter 3 Pump Calibration

These pump calibration procedures are for all personal sampling pumps. Although flow required flow rates may vary, the calibration procedures are still the same.

Below are typical flow rates in liters per minute (lpm) for various contaminate sampling:

- Respirable dust.....1.700 lpm
- Lead.....1.700 lpm – 2.000 lpm
- Arsenic1.700 lpm – 2.000 lpm
- Mercury (sorber tube)0.200 lpm
- Welding Fumes1.700 lpm – 2.000 lpm

Respirable dust requires the use of a 10 millimeter cyclone with a flow rate of 1.700 lpm. A 1.700 lpm flow rate is required for the cyclone to work correctly.

Other particulate sampling such as lead, arsenic & welding fumes require a flow that will achieve a sufficient loading on the sampling cassette. If higher concentrations are suspected, lower flow rates can be used. If low concentrations are suspected, higher flow rates can be used in order to accumulate more particulates on the sample cassettes. (If there is an insufficient amount of particulates on the sample cassette, the lab may not be able to analyze it.)

If sampling for mercury vapor with sorber tubes, flow rates should be set at 0.020 lpm. This usually requires a low-flow pump or low-flow adapter equipment that works in conjunction with your personal sampling pump.

Calibration Procedures:

- Pumps should be fully charged prior to calibrating.
- Turn pumps on and let run for 10 – 15 minutes before calibrating. Batteries will have a ‘peak’ charge when removed from the charging unit. This may cause the pump to run slightly faster until the peak charge is gone. Once pumps have run 10 – 15 minutes the peak should be gone and pumps will run at normal speeds. Some brands of pumps may have a ‘peak’ indicator that will let you know if the peak exists or not.

There are two different types of primary calibrators; dry & wet. Use the Gillibrator Bubble Generator calibration method below if you are using a bubble generator calibrator. Use the Dry Cal method if you are using a dry calibrator.

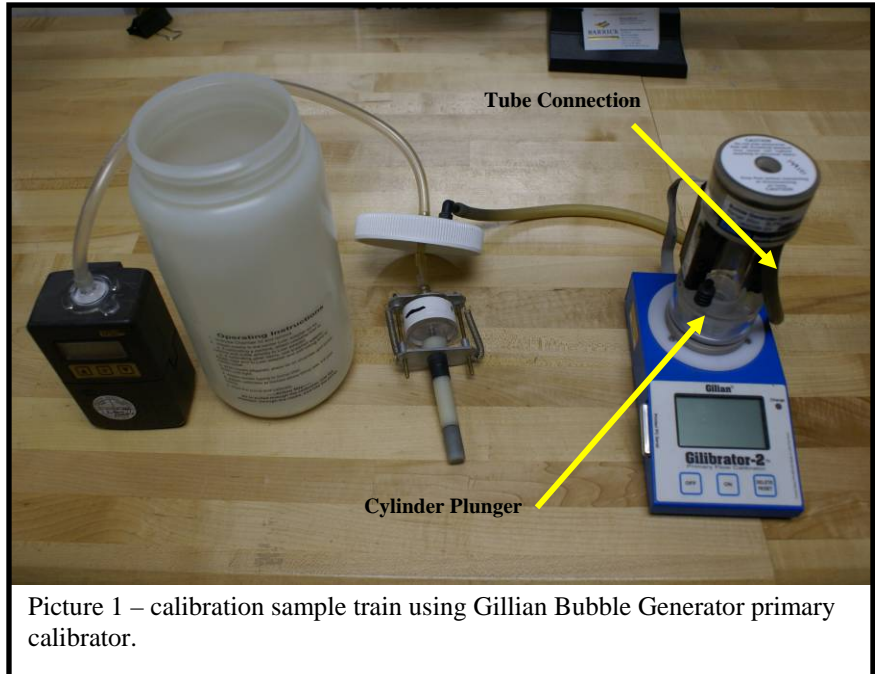
Gillibrator Bubble Generator:

A Gillibrator uses a mild soap solution to create a bubble inside an internal chamber. The bubble is pulled from the bottom of the chamber to the top by the air-flow created by the sampling pump. The bubble is timed by the Gillibrator and a flow rate is calculated by the amount of time it takes the bubble to travel from the bottom of the chamber to the top.

To use the Gillibrator, make sure there is enough mild soap solution in the bottom of the Gillibrator cylinder to sufficiently cover the bottom.

Connect the sample train as seen in Picture 1.

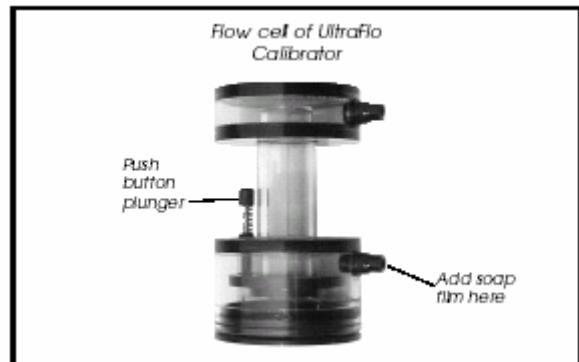
1. Connect one end of the Tygon tubing to the intake of your sampling pump.
2. Connect the other end of the Tygon tubing to the lid of the calibration jar (make sure it is the port connected to the top of the cyclone).
3. Connect another Tygon tubing to the suction side of the calibration jar lid
4. The other end of this tubing must be connected to the 'out' (top) nipple of the Gillibrator cylinder.



Picture 1 – calibration sample train using Gillian Bubble Generator primary calibrator.

Turn the Gillibrator on (your pump should already be running).

Depress the cylinder plunger at the bottom of the cylinder to allow a soap bubble to be picked up inside the cylinder. Release the plunger to allow the bubble to travel to the top of the cylinder. The flow rate will display on the screen. Repeat this total of 10 times. Some models will display the average flow rate on the display. On other models, you will have to press the average button to see the average. Adjust your pump to get your flow rate as close to the desired flow rate (+/- 0.02 lpm) as possible. Repeat the calibration process each time you adjust the pump.



Dry Cal Primary Calibrator

Dry primary calibrators do not require any liquids or soap solutions. Assemble the sampling train as shown in Picture 2. The sample train is identical to the Gillibrator Bubble Generator. The Tygon tubing must be connected to the 'out' nipple of the DryCal.

1. Press the sample button & release to begin the sample. The internal cylinder will actuate and the flow rate will be displayed on the display screen.

Most models will also display the average flow rate up to 10 samples. (If the sample button is pressed & held for approximately 3 seconds, the DryCal will continue to sample until the stop button is pressed. This is faster than pressing the sample button each time).

2. If after 10 samples your flow rate is not at the desired flow rate (± 0.02 lpm), adjust the pump and recheck the calibration.

Post Calibration Procedures

1. Perform calibration procedures as explained above, however do not adjust the pump calibration. Record the each flow rate and get an average after 10-cycles. Use this average for the post-calibration average. Average the pre & post calibration rates to get your final flow rate.

Please note: If your post calibration varies by more than 5% of the pre calibration, the sample must be void.

Refer to the pumps user manual for instructions on how to adjust the flow.

All primary calibrators must be sent to the manufacture annually for calibration.

