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| Gravimetric Laboratory and Filter Handling Guide |
| *Gravimetric Lab SOP Reference* |
| Revision Number 010/28/15 |

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# [Filter Handling in the Gravimetric Laboratory](#Table_Of_Contents)

## [Summary of Method](#Table_Of_Contents)

The Environmental Protection Agency (EPA) suggests that the internal station temperature have a variance of ±2 Degrees Celsius (±3.6 Degrees Fahrenheit) from the set point between 20 and 30 Degrees Celsius (68 and 86 Degrees Fahrenheit). The Zeno 3200 sensor is ±1 Degree Celsius accurate (±1.8 Degrees Fahrenheit accurate).

## [Acceptance of new filters and Filter Integrity Check](#Table_Of_Contents)

The following is the procedure for the Filter Integrity Check and Pre-Sampling Conditioning:

1. Select the next new box (lot) of 50 filters (in numerical order) to be opened and prepared for use.
2. Select four Petri dishes and label them with the corresponding barcodes for the first four filters of the new lot.
3. Mark the first two Petri dishes with “LT” for “lot blank,” and the next two with “LB” for “lab blank”.
4. Select enough Petri dishes for the remaining filters in the lot. Do not label these Petri dishes.
5. Write the appropriate filter numbers, in numerical order, in the filter number column in the filter assignment log. Note any lot blanks with an “LT”, and any lab blanks with an “LB”.
6. Open the new box of filters and examine each filter for defects including pinholes, separation of the ring, chaff or flashing, loose material, discoloration, filter non-uniformity, or other imperfections. (Refer to EPA Quality Assurance Guidance Document 2.12, section 7.5 for details.) If imperfections are found, discard the filter and document it as “void” in the filter assignment log.
7. Examine the filter number on the ring of each filter. Make sure each filter number is in sequence and that there are no repeated or omitted numbers. If there is a repeated number, discard one of the duplicate filters, and document the duplicate in the filter assignment log.
8. In the filter assignment log, denote whether each filter passed or failed the integrity check. Discard unacceptable filters.
9. Place “LB” and “LT” filters in corresponding labeled Petri dishes. After passing the filter integrity check, place the filters in an unlabeled Petri dish.
10. Place each Petri dish in filter tray and place the lids partially over the dishes. Cover with a solid tray.
11. Condition filters in the lab for at least 24 hours.

Bring the certified calibrator (DeltaCal) into the monitoring shelter.

## [Filter Pre-conditioning and weighing](#Table_Of_Contents)

1. Check the monitoring schedule and decide how many filters will be needed to be weighed and note their numbers for the log entry.
2. Put clean room gloves on prior to handling the filters.
3. Remove the preconditioned filters from the tray and place them on the table.
4. Select the appropriate amount of clean cassettes and arrange in numerical order based on numbers written on the cassette rims.
5. Place the bar code labels corresponding to the filters on the cassette dishes.
6. Enter the cassette numbers in the filter assignment log in the proper places in the cassette number column, and the pre-weigh date for the batch of filters.
7. Make log entry: Date, temperature, humidity, “Pre-sampling weighing of filters,” Filter numbers.
8. Turn on balance and press F1 key to initiate the internal calibration.
9. Fill out the laboratory data form: Lot number (from filter box). Pre-sampling date, humidity, and temperature. In filter number column: “100 mg mass standard”. In filter number column: “200 mg mass standard”.
10. Tare the balance.
11. Open the balance door using left door-opening/closing button.
12. Place a 100 mg mass standard on the center of the balance plate using tweezers. Note: Plastic tweezers in mass standard box are for use on mass standards only. Metal filter tweezers are for use on filters only.
13. Close balance door by pushing left door-opening/closing button.
14. Wait for the units “mg” to appear on balance readout. This signifies that the balance has stabilized.
15. Wait approximately 15 more seconds and record the weight displayed on the readout in pre-sampling mass column on the lab data form. (Double check to ensure the correct weight has been recorded).
16. Open the balance door and remove the mass standard with the mass standard tweezers (plastic) and place the standard back into the mass standard box.
17. Close the balance door and allow the balance to stabilize once more at zero.
18. Tare the balance.
19. Open the balance door and weigh the 200 mg mass standard in the same manner as in Steps 12 through 16.
20. Prior to weighing each filter, it must be deionized so that a static charge will not affect the mass measurement. Using tweezers, position the filter inside the de­ionizing chamber so that it does not touch the chamber walls.
21. Let the filter remain inside the chamber for a minimum of thirty seconds.
22. Open the balance door and place the deionized filter inside, centered on the balance pan.
23. Close the balance door by pushing the left door-opening/closing button.
24. Allow the balance to stabilize and wait thirty seconds. Record the filter number; noting lot blanks (LT), lab blanks (LB), repeated filters (R), and their masses in appropriate columns on laboratory data form. Double check to ensure the right mass has been recorded.
25. Open the corresponding clean filter cassette by placing it in the milled aluminum block and sliding it down the ramp until upper and lower halves separate. The written number on the cassette should be facing up and the metal screen should remain with the bottom half of the cassette.
26. Open the balance and remove filter with filter tweezers.
27. Place the weighed filter into the bottom portion of the filter cassette.
28. Place the top portion of cassette on top of the bottom portion and squeeze the halves together in order to close the cassette. Make sure the cassette is closed securely.
29. Place the cassette into a Petri dish and secure the lid with rubber bands and then place the Petri dish into the tray on filter shelf.
30. Repeat steps 21 to 29 for up to 10 filters.
31. After the 10th filter, re-weigh the first filter weighed (usually a lot or lab blank) and both mass standards as a QA check to ensure that the balance has not drifted.
32. Record the weights on laboratory data form.
33. Exit the gravimetric lab opening only one door at a time.
34. Make a photocopy of the laboratory data form for the data entry.
35. Following Steps 3 through 6 of Section 2, return the original laboratory data form to the FRM 2.5 Gravimetric Laboratory Records Binder.

# [Filter Assignments and Field Data Sheets](#Table_Of_Contents)

The following is the procedure for Preparing Filters for Field Sampling:

1. Check the sampling schedule to determine when the next run dates are for desired stations. A maximum of four filters may be packaged at a time for daily samplers, two for 1 in 3 day samplers, and one for 1 in 6 day samplers.
2. Select the pre-weighed filters in cassettes in numerical order.
3. On field the data sheet, record the station ID and run dates in order as well as the cassette ID’s.
4. Apply a bar code sticker onto filter ID slots on field data sheet.
5. Record run dates and site codes in the filter assignment log.
6. On the station schedule, circle the run dates for which the filters are ready.
7. Place the filters and the field data sheet(s) in a 1-gallon resealable plastic bag for transport so that station ID and run dates are visible.
8. Exit the gravimetric lab by first opening the inner door and closing it behind you before opening the outer door.
9. Place the bag in the freezer on the “outgoing” shelf.

# [Filter Post conditioning, weighing, and archival](#Table_Of_Contents)

The following is the procedure for the Post-Sampling Conditioning of Filters:

1. Collect incoming filters from the freezer.

2. Enter mass balance room opening one door at a time and stepping firmly on tacky mats.

3. Remove the Petri dishes containing filter cassettes from the bags and place them on the filter tray.

4. Arrange the Petri dishes in numerical order and remove the rubber bands that are around them.

5. Make log entry: Date, temperature, and humidity, “Begin 24 hour post sampling conditioning of filters,” Filter numbers.

6. Partially uncover each filter cassette by placing each lid halfway over the Petri dish.

 7. Cover filter tray with solid cover and condition filters for a minimum of 24 hours.

The following is the procedure for the Post-Sampling Weighting of Filters:

1. At the end of the 24-hour post-sampling conditioning period, completely cover all cassettes with Petri dish lids.
2. Make log entry: Date, temperature, humidity. “Post-sampling weighing of filters.” Filter numbers.
3. Turn on balance and press F1 key to initiate the internal calibration.
4. Fill out laboratory data form. Lot number (from filter box). Post-sampling weighing date, humidity, temperature.
5. Tare the balance.
6. Open the balance door using left door-opening/closing button.
7. Place100 mg mass standard on the center of the balance plate using tweezers. Note: Plastic tweezers in mass standard box are for use on mass standards only. Metal filter tweezers are for use on filters only.
8. Close the balance door by pushing the left door-opening/closing button.
9. Wait for the units “mg” to appear on balance readout. This signifies that the balance has stabilized.
10. Wait approximately 15 more seconds after the stabilization, and record the mass displayed on readout in the post-sampling mass column on the lab data form.
11. Open the balance door and remove the mass standard with the tweezers. Place the standard back in mass standard box.
12. Close the balance door and allow the balance to stabilize once more.
13. Tare the balance.
14. Open the balance door and weigh the 200 mg mass standard in the same manner as in steps 7-12.
15. After the 200 mg mass standard has been weighed and the weight has been recorded, remove the first lab blank filter from the Petri dish using the tweezers and place the tweezers so that the filter is inside the deionizing chamber and not touching any of its walls.
16. Let the filter remain inside the chamber for at least thirty seconds.
17. Tare the balance.
18. Open the balance door and place the deionized filter centered on the balance pan.
19. Close the balance door.
20. Allow the balance to stabilize and wait 15 more seconds. Record the filter number and weight in the appropriate columns on the laboratory data form. To minimize errors, double check entries to ensure the correct weights have been recorded.
21. Open first filter cassette by placing it in the milled aluminum block and sliding it down the ramp until upper and lower halves separate. The written number on the cassette should be facing up and the metal screen along with the sampled filter should remain with the bottom half of the cassette.
22. Remove the filter from the cassette using the tweezers and place the tweezers so that the filter is inside the deionizing chamber and not touching any of its walls.
23. Let the filter remain inside the chamber for at least thirty seconds.
24. Weigh the filter following the procedure outlined in steps 17-20, and then use tweezers to place the filter into the Petri slide for long-term storage.
25. Apply the correct barcode label to the Petri slide.
26. Repeat procedure with remaining sampled filters in cassettes.
27. Reweigh and record the first filter weighed (usually a lab blank) and both mass standards as a QA check to ensure that the balance has not drifted.
28. When finished weighing, place used the cassettes in 1-gallon resealable plastic bags, and store them in the lab separately from clean cassettes. Note: Comments section of lab data form is used to document unusual readings, lab errors, and different post-sampling dates.
29. Exit the gravimetric lab, opening only one door at a time.
30. Place Petri slides containing post-sampled filters into correct numbered storage box and place in freezer.
31. Make a photocopy of the laboratory data form for data entry.
32. Following correct procedure for entering gravimetric lab, return the original laboratory data form to the Mass Balance Room Records Binder.