ProWeigh® filters – A Novel Approach to Solids Testing

*Standard Methods for the Examination of Water and Wastewater* requires that the 1.5 µm, glass fiber filter used for solids determinations be prepared by rinsing with distilled or deionized water, oven drying, cooling, and then weighing to the nearest 0.1 milligram. ProWeigh® filters, a product designed to eliminate the labor and time involved in the preparation of the filter, meet all the method requirements found in *Standard Methods* 2540D and 2540E.

This product is novel in that it is simply a machine-produced duplication of the tasks necessary for Total Suspended Solids (TSS) testing, and not a new test method. Since the product is a replication of present laboratory efforts, only routine blank testing is required and no equivalency testing needs to be done. ProWeigh® meets all of the EPA requirements for a TSS filter, thereby meeting with EPA approval.

**MANUFACTURING PROCESS**

ProWeigh® filters are laser cut to ensure accuracy and smooth edges. Traditionally, filters have been cut using a click press. This can fray the filter material which can be lost during testing, thereby affecting the final weight. The 1.5µm, borosilicate glass fiber filters are vacuum rinsed with three aliquots of deionized water, which removes any loose fibers to provide consistent blanks. After washing, the filters are oven dried at 105°C for 90 minutes in a horizontal flow mechanical convection oven, and then transferred to a desiccating cabinet to cool for 24 hours. After preparation, the filters are weighed robotically to the nearest 0.1 mg using a certified, computer-interfaced balance. Each filter is placed in an aluminum dish that has the weight of the filter and the filter identification number printed on a heat-resistant Mylar® label which are automatically affixed to the aluminum planchet. As a continuing quality check, 8 percent of all filters are redried and reweighed, assuring filter weight stability and reproducibility.

**USING THE FILTERS**

To perform a TSS sample evaluation, the analyst takes the filter from its aluminum dish and places it in a vacuum filtration apparatus. The sample is filtered across the ProWeigh® and the filter is then returned to its aluminum weigh pan. The pan is placed in a 105°C oven for one hour and then cooled to balance temperature in a desiccator. The filter is weighed and then returned to its pan. The pan is returned to the 105°C oven for one hour and then cooled to balance temperature in a desiccator once more. The filter is weighed a second time and the two final weights must be within a 0.5 mg of each other. If not, the cycle of heating, cooling, and weighing must be repeated until two, consecutive weights are within the specified tolerance of 0.5 mg.

To address a frequently voiced concern regarding this product, the initial recorded weight indicated on the pan label is not affected by absorbed moisture. The filter tare weight is captured when the filter is completely dried and desiccated. The testing laboratory's final weighing is performed after drying and
desiccating. Therefore, all interim air moisture absorbed by the filter while in transit or on the stock shelf of the laboratory is a nonfactor and will be removed before the final filter weight is measured.

In addition, the use of different balances should not affect accuracy. Balances must be calibrated routinely to ensure correct results. Environmental Express balances are repeatedly certified with NIST weights and are calibrated internally several times during each working day.

PRODUCT ADVANTAGES

Current users of the fully-prepared ProWeigh® filters enjoy the improved accuracy, time and cost savings, and convenience that this product provides. Laboratories enjoy the benefit of half the turnaround time on a TSS sample. Also, because TSS analysis routinely sells for $8.00 to $16.00 and is, therefore, generally of low value to the laboratory, the technician can perform additional and more revenue generating tasks.

When the filter cost was added to actual labor cost, one customer found that by switching to ProWeigh® filters, they were able to save about 10 percent in the total cost of performing a single TSS. With over 20 TSS sample tests performed each day in this busy municipal lab, an extra 30 minutes per day is now productively redirected to the performance of other pressing requirements.

ProWeigh® is a standard 47 mm filter that is used with any common 47 mm filter funnel. Crucible users who do not use a filter funnel for TSS have found three distinct advantages in changing to this product:

- Most crucible filters measure less than 25 mm in diameter, so thick, sludgy samples filter 3-4 times quicker because of the vastly increased surface area.
- Solids routinely adhere to the sides of crucibles and are then baked on. Great difficulty is encountered in scouring and scrubbing afterwards. With ProWeigh®, little washing is required because solids adhering to the sides of the filter funnel are washed onto the filter using a squirt bottle of deionized water.
- Finally, 99 percent of all labs using crucibles already possess at least one 47 mm filter funnel of some design. Therefore, new equipment does not need to be purchased to switch over to this product. It is important, however, for crucible users to fully understand that only the filter will be weighed when using ProWeigh® as the crucible method requires that both the filter and crucible be weighed in tandem.

APPLICATIONS FOR FIXED OR VOLATILE SOLIDS

ProWeigh® filters are also available for fixed or volatile solids. After washing the filter, these filters are heated in a muffle furnace to 550°C to drive off any potential volatiles present on the glass fiber. As with all ProWeigh® products, they are desiccated to balance temperature, weighed to the nearest 0.1 mg and quality checked for accuracy.
KEEPING THE AUDITORS HAPPY

We all know how auditors can be very meticulous in their findings. *Standard Methods* 2540D states that during the filter preparation, the filter must be weighed twice and these two weights must be consistent and within the 0.5 mg tolerance. Our ProWeigh® filters meet these requirements but only the first weight is recorded. Some auditors and regulatory bodies require that the second weight is documented to prove method compliance. Environmental Express has a solution to this requirement, The ProWeigh® DoubleWeigh filter. The DoubleWeigh filters are prepared the same way as the ProWeigh® filters except that both weights are recorded.

In summation, the ProWeigh filter family of products saves you valuable time, money, and resources by eliminating the need for TSS/VSS filter prep. On average, you can save up to 3+ hours of prep time that can be utilized on more productive, revenue-generating tasks.