# Balance Calibration and Maintenance

## 1. Scope and Application

This Standard Operating Procedure describes how to check the calibration of balances and reflects the QC limits and the procedures to follow if a balance falls outside of the QC limits.

The degree of accuracy of the balance is reflected in the accuracy of all data related to weight-prepared standards, spikes and sample dilutions as well as weight determinations of samples. Because this accuracy is critical to our operation, each balance's calibration must be checked before it is put into service each day. The results are recorded in the logbook associated with the balance.

## 2. Summary of Process

Balances are checked daily or on each day of use against Class S-1 weights that are certified to be traceable to the National Institute of Standards and Technology (NIST). These weights are also calibrated and certified by an outside vendor. Certificates are kept on file, and records are kept for the daily balance calibration checks.

## 3. Safety

Calibration of balances occurs within the laboratory areas. Therefore, the use of personal protective equipment (PPE) is required as necessary. i.e. disposable gloves (latex or nitrile), safety glasses and laboratory coats should be worn.

## 4. Equipment and Supplies

### 4.1 Class S-1 weights.

Troemner Class S-1 weights Serial #: S088 300g weight Serial #: 50746
Troemner Class S-1 weights Serial #: 48886 300g weight Serial #: 53124

### 4.2 Forceps and/or Kim-Wipes.

### 4.3 Balance cleaning brush.

## 5. Procedure

**5.1** Make sure that the pan is clean and the balance level.

**5.2** Tare the balance.

**5.3** Place the weight on the pan with the forceps provided or a Kim-Wipe. When choosing a weight for calibration, be sure that the weight is within the range of typical use for that balance. Top loader balances typically are checked within the range of 1g-100g while analytical balances are typically checked within the range of 2mg-10g. A variety of weights are used monthly to verify accuracy over the range of operation for the balance.

**5.4** Record the true values of the calibration weights along with the actual readings of the balance to the $n^{th}$ number of decimal places specific for the balance. The true values of the calibration weights are indicated on each weight. Also record the date and the analyst's initials in the appropriate logbook. Each set of S-1 weights has a corresponding logbook page (which is a controlled document). It is important to record the actual readings of the

balance on the appropriate logbook page. This can be verified by comparing the serial number of the weights to the information on the top of the logbook page. Controlled document pages are 108-07,108-08, 108-05 and 108-06.

## 6. Quality Control and Operational Assessment

Modern analytical balances are fragile instruments. They are subject to shock, temperature and humidity changes and to mishandling. Some of the precautions to be observed in maintaining and prolonging the usable lifetime of an analytical balance are listed below.

Balances should be located on heavy shockproof tables away from laboratory traffic and protected from sudden changes in temperature and humidity.

Check that the balance is level before each use.

When the balance is not in use objects should be removed from the weighing pan and the weighing compartment closed.

The balance should be kept clean at all times. Clean up spilled chemicals and samples immediately.

Weights should be handled using either Kim-Wipes or forceps supplied with the weights, never with bare hands. This proper handling prevents damaging or dirtying the weights which would affect their accuracy.

Semi-annually, an outside Laboratory Instrument Service Contractor performs a complete service on each balance. This includes a thorough cleaning, a check of all working parts and calibration using NIST traceable class 1 weights.

Annually, the in-house class 1 weights are sent out for cleaning to a certified Weighing Systems Contractor and return with a Mass Value certificate traceable to NIST

## 7. Corrective Actions

Control limits are indicated on each page in the balance logbook. Analytical balances are in control if they read to 0.1% of the true value (10g range = 9.99-10.01). Top loading balances are in control if they read to 1% of the true value (100g range = 99.9-100.1). If the reading is outside the control limits for any one calibration weight, clean, level and tare the balance again before repeating the procedure. Record both the first and the second attempts in the logbook. If the calibration is still not confirmed, do not perform any analytical operations using the balance. Notify the QA Department so that service can be arranged and the balance can either be removed from the lab or tagged out with a sign attached to the balance indicating that the balance is "Not Operational - Do Not Use" so it will no longer be utilized.

## 8. Attachments

None.