

National Human Exposure Assessment Survey (NHEXAS)

Region 5 Study

Quality Systems and Implementation Plan for Human Exposure Assessment

Research Triangle Institute
Research Triangle Park, NC 27079
Cooperative Agreement CR 821902

Standard Operating Procedure

NHX/SOP-160-008

Title: Mettler AE163 and AE240 Electronic Balance

Source: Research Triangle Institute

U.S. Environmental Protection Agency
Office of Research and Development
Human Exposure & Atmospheric Sciences Division
Human Exposure Research Branch

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**STANDARD
OPERATING
PROCEDURE**

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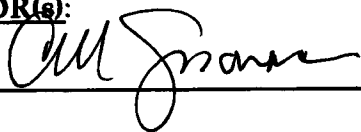
NHX/SOP-160-008

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TITLE: STANDARD OPERATING PROCEDURE FOR METTLER AE163 AND AE240
ELECTRONIC BALANCE

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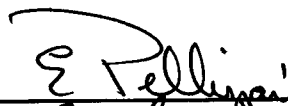
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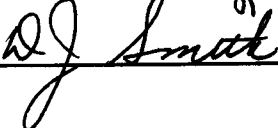
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Standard Operating Procedure for the
Mettler AE 163 and AE 240 Electronic Balance
NHX/SOP-160-008

1.0 INTRODUCTION

Quantitative analytical results often depend directly on accurate weight determinations of various items used in the analytical procedure. To insure that this crucial piece of equipment is properly calibrated and maintained, with appropriate documentation, strict adherence to this SOP is required. Calibration, maintenance, and inspection of the balance are the responsibilities of the balance custodian. NOTE: Names of equipment custodians are maintained by the ACS QA Officer.

* 2.0 INSTRUMENTATION

The Mettler AE 163 and AE 240 are electronic, dual range analytical balances with an enclosed weighing pan. Weight ranges for the AE 163 are 0-30 g (0.01 mg readability) and 0-160 g (0.1 mg readability). Weight ranges for the AE 240 are 0-41 g (0.01 mg readability) and 0-205 g (0.1 mg readability).

* 3.0 INSTRUCTION MANUAL

A copy of the instruction manual is kept in the ACS QA office. Instructions for operation of the balance are kept with the balance logbook; a copy is included in this SOP.

NOTE: The instruction manual for the AE163 also serves as the manual for the AE 240.

4.0 CALIBRATION

The balance will be calibrated annually by the manufacturer or the manufacturer's representative. Calibration should be verified (see below) each time the balance is moved, cleaned, and at other intervals depending upon usage and project protocol.

5.0 ROUTINE VERIFICATION OF CALIBRATION

5.1 Built-in Calibration Weight

When the balance is moved or cleaned, calibration using the built-in calibration weight is to be conducted as follows:

1. Remove all objects from the pan.
2. Close the sliding windows.
3. Set the balance to the calibration mode (press control bar until "CAL" is displayed, release control bar. "CAL ----" will appear in the display).
4. The calibration weight is placed in position by means of the calibration lever (on right side at bottom of balance).
5. As soon as "CAL 100" appears (the 100 blinks), slowly move the calibration lever towards the rear all the way to the stop.
6. First, "CAL ----" appears, then "100.0000". When the display "CAL 0" appears (0 blinks), move lever back to original position. Wait: display "----" followed by "0.0000" appears. The balance is now calibrated in both weight ranges.

5.2 Standard Weights

The following procedure must be carried out at each weighing session:

1. Briefly press control bar ("8.8.8.8.8.8.8.8." is displayed followed by "0.0000")
2. Place a calibration weight (use a weight that corresponds to the weight range that will be used during the weighing session) on the pan. NOTE: the QA Office maintains a set of standard weights for calibration use.

3. Note the weight, and record the weight, date, standard weight used, and name of weigher in the balance logbook.
4. Calculate the % deviation:
$$\% \text{ dev} = [(W_r - W_s) / W_s] * 100$$
where W_r = weight recorded on balance, and W_s = standard weight.
5. If % deviation is greater than 1%, the balance must be recalibrated using the internal calibration weight followed by calibration check using a standard weight. If the % deviation is still greater than 1%, do not use the balance; notify the balance custodian.

6.0 ROUTINE MAINTENANCE

At least once per month, the balance should be inspected for general cleanliness and operational status (empty pan weight determination). Inspection is the responsibility of the balance custodian. Any problems should be rectified and reported to the laboratory supervisor.

7.0 NONROUTINE MAINTENANCE

In the event of balance failure or malfunction, the balance custodian is responsible for arranging appropriate repairs in order to return the unit to working specifications. The custodian will also ensure that the balance is not used until it is returned to an acceptable working state. Following any repairs, it must be demonstrated (and documented) that the balance is working correctly. This is to be accomplished by (1) calibration by the manufacturer or manufacturer's representative, or (2) calibration using the built-in calibration weight as described in Section 5.1.

8.0 DOCUMENTATION

A hard-bound book must be maintained for balance records. All calibration information must be kept in the hard-bound book, including:

1. Date of calibration
2. Name of person performing the calibration
3. Results of the procedure.

All maintenance operations must be recorded in the book. This includes balance cleaning and any service work required for proper operation of the balance. The book shall be kept in close proximity to the balance.

*Denotes revised sections