Calibration and Use of the Mettler Toledo 403TS/00 Balance

1. SCOPE AND APPLICATION

    1.1. This method is based on the Mettler Toledo application manual for the Mettler Toledo Precision and Analytical Balances MS-TS line of balances. It is applicable to the Mettler Toledo MS 403TS/00 balance and can be modified for similar balances. It covers the basic functions of weighing, taring and calibration. ASTM Class 1 and 0 weights are certified. The MS 403TS/00 weighs to 0.001 grams. The maximum allowable load is 420.0 grams.

2. SUMMARY OF METHOD

    2.1. The Mettler Toledo MS 403TS/00 balance is calibrated (internal calibration) at least every month, anytime that it is moved, or whenever the Class 1 "working" weights are not within tolerance. The balance calibration is checked before each use, quarterly with all biology Class 1 weights, and annually with all Class 1 and Class 0 (reference) weights. Weight measurements are recorded in appropriate bench sheets and logbooks (Calibration and Daily Use).

        2.1.1. Use of this SOP constitutes acknowledgement that the user has read the appropriate (weighing, taring, and calibration) sections of the Mettler Toledo application manual for the Mettler Toledo Precision and Analytical Balances MS-TS line of balances. It is presumed that the balance has been used and has remained in a specific location. Anytime there appears to be a problem (weights and/or calibration out of tolerance), a supervisor must be notified.

    2.2. Interferences

        2.2.1. Air currents, temperature (> ± 2° C of room temperature), vibrations, dirty calibration weights, improper calibration or taring, compounds left on balance plate.

3. EQUIPMENT AND SUPPLIES

    3.1. Calibration weights (Class 1 working weights and/or Chemistry reference weights (Class 0))

    3.2. Mettler Toledo MS 403TS/00 Balance, Ser. # B815673069

    3.3. *Mettler MS 403TS/00 Ser. # B815673069 Calibration Logbook*

    3.4. *Mettler MS 403TS/00 Ser. # B815673069 Daily Use Logbook*

    3.5. Spatula

    3.6. Weigh boats

4. CALIBRATION

Note: An internal calibration ("auto-adjust"; See 4.3 below.) is performed before the balance is used for the first time, at regular intervals during the service life of the balance, after change of location and when Class 1 working weights are out of tolerance.

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4.1. Ensure that the weighing pan is unloaded. Switch the balance on by pressing and holding the Power Button ( ). The display should light up and display 0.000g.

4.2. Once the balance is on, be sure that the balance is level by checking the air bubble on the left side of the balance. Be sure that the air bubble is within the inner circle on the level. (If the balance is not level, the icon will appear on the balance display.)

4.2.1. To adjust the balance, rotate the feet in the front of the balance until the air bubble is in the center of the balance level.

4.3. Once the balance is level, an internal adjustment/calibration is performed by pressing the "Auto-adjust" button on the balance screen ( ).

4.4. Once the balance is adjusted, zero the balance by pressing the "Zero" button (→0←).

4.5. For Quarterly balance calibration verification, all Class 1 working weights are checked on the balance and recorded in the Calibration log.

4.6. For Annual Balance Calibrations, all Class 1 working weights and Class 0 reference weights are checked and recorded in the Calibration log.

5. DAILY USE

5.1. Before the balance is used each day, the calibration is checked with Class 1 weights.

5.1.1. The weights used for the calibration check must bracket the weight of what is being weighed. For example, if weighing out 4.1 g of a reagent, verify the calibration at 3.0 g and 5.0 g.

5.2. Turn the balance on and check to be sure the standard "weighing" mode is selected. If not, press the activities button ( ). Then, select the standard "weighing" option ( ).

5.3. Zero the balance and place the lesser weight on the weighing pan. Record the weight in the corresponding space in the *Mettler MS 403TS/00 Ser. # B815673069 Daily Use Logbook***.**

5.4. Repeat Section 5.3 for the greater Class 1 weight.

5.5. The weight tolerance for the Daily calibration checks are as follows:

Class 1 -Weight Value (g)	Weight Tolerance (g)	Weight Tolerance (% of weight)
4000	4	0.1
2000	2	0.1
300	0.3	0.1
100	0.1	0.1
50	0.05	0.1
20	0.02	0.1
10	0.01	0.1

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Class 1 -Weight Value (g)	Weight Tolerance (g)	Weight Tolerance (% of weight)
5.0	0.005	0.1
2.0	0.002	0.1
1.0	0.001	0.1
0.5	0.005	1.0
0.2	0.002	1.0
0.1	0.002	2.0
0.05	0.001	2.0
0.02	0.0004	2.0
0.01	0.0002	2.0
0.005	0.0002	4.0
0.002	0.0001	5.0
0.001	0.0001	10.0

5.5.1. If the balance does not meet the prescribed tolerances, be sure the balance is level by checking the air bubble on the top left side of the balance. If the balance is level, perform an internal adjustment (See 4.3 above.) and attempt the calibration check again. If it continues to fail, contact a supervisor.

5.6. After the daily calibration check is complete, place the proper size weigh boat for the substance/object being weighed on the balance platform. Chemicals and/or objects that can damage the balance platform must never be placed directly on the balance platform.

5.7. If weighing a set amount of substance, place a weigh boat on the balance platform and press (→T←) to tare the balance. Add the substance/object to be weighed to the weigh boat until the desired weight is displayed. If needed, use a clean spatula to remove any excess from the weigh boat.

5.8. If determining the weight of a substance, place a weigh boat on the balance platform and press (→T←) to tare the balance. Add the substance/object to be weighed to the weigh boat and record the displayed weight.

5.9. To make more than one measurement, remove the weighed object/weigh boat and repeat Section 5.6 or 5.7.

5.10. After weighing is completed, press and hold the power button (⏻) to prompt the screen to turn the balance off. Select the check mark (✓) to turn the balance off.

6. DATA ARCHIVAL

6.1. Use a black, waterproof pen for all bench sheets and logbooks.

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6.2. Record weights as appropriate on bench sheets and in the *Mettler MS 403TS/00 Ser. #B815673069 Calibration Logbook* and the *Mettler MS 403TS/00 Ser. #B815673069 Daily Use Log.*

6.3. To correct raw data entries, place a single line through the incorrect or illegible entry, write the corrected entry near the error, date and initial the correction. Do not overwrite entries.

6.3.1. The corrected entry is written as near as possible to the error or in the comment box on the appropriate bench sheet.

6.3.2. If the correction requires an explanation, write a comment and reference the error with a letter. Initial and date the explanation. Do not attempt to put all information (correction and comments) into a small space.

6.3.3. Use sequential alphabetical annotation to identify errors and corresponding comments (use A for first error and use A for corresponding explanatory comment; use B for second error, etc.).

7. QUALITY CONTROL

7.1. Ensure Class 1 weights are within listed tolerances and are either checked annually against the certified Class 0 weights (maintained by the Chemistry Program) or they have been recertified.

8. SAFETY/HAZARDOUS WASTE MANAGEMENT

8.1. Proper laboratory protection, including lab hood or ventilation system, lab coat, gloves and safety glasses, is required when working with chemicals and unprocessed samples.

8.2. Refer to the Laboratory Quality Manual for sample disposal.

8.3. Refer to the Laboratory Health and Safety Manual and Hazardous Waste Management.

8.4. Read MSDS information for reagent handling and disposal.

9. REFERENCES

9.1. Mettler Toledo Application Manual for the Mettler Toledo MS 403TS/00 line of balances

9.2. DEP Laboratory Quality Manual DEP Laboratory Quality Assurance Manual and SOPs | Florida Department of Environmental Protection

9.3. DEP Laboratory Health and Safety Manual https://www.floridadep.net/resources/health-safety-manual

9.4. MSDS Information Sheets

APPENDIX OF CHANGES

09/04/2020 Updated data archival section with universal language. Updated links.

05/03/2021 Updated links and universal language

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09/09/2022 Updated R-weight and S-weight references, made grammatical changes.

09/05/2023 Updated link, updated the weights to be class 1 or class 2 weights.

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