

	Standard Operating Procedure	SOP Number D-708	Revision 6
	Use of a Top Loading Balance	Effective Date 02/16/22	Page Page 1 of 6
Written by/ Date SS 12/13/21	Reviewed by/ Date SAS 12/13/21	Approved by/ Date Jm 12/16/21	
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1.0 Purpose

This procedure provides instruction for the calibration and use of a top loading balance

2.0 Scope

This procedure generally applies top loading scales that can accurately measure to either 0.1g or 0.01g. This procedure is compliant with USP <41> Weights and Balances.

3.0 Responsibility

- 3.1 It is the responsibility of QC, QC Laboratory, and R&D analysts to comply with this procedure.
- 3.2 QC Inspectors are responsible for the calibration and use of top the loading balances specified in this procedure.
- 3.3 The QC Laboratory Director and QC Laboratory Supervisor are responsible for ensuring analysts comply with this procedure.
- 3.4 It is the responsibility of QC Laboratory Management to keep this procedure current to latest Ion Labs Practices.

4.0 Definitions

- 4.1 **QC** - Quality Control
- 4.2 **R&D** - Research and Development
- 4.3 **Hysteresis** - In a balance, is caused by excessive stretching of the springs and is primarily due to overloading or dropping an object on the weigh pan; excessive stretching of springs is cause for major repair

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5.0 References

- 5.1 USP <41> - Weights and Balances
- 5.2 ANSI/ASTM E617, American National Standard, Laboratory Weights and Precision Mass Standards.
- 5.3 D-707, SOP, Use of Balances in the QC Laboratory
- 5.4 D-707-F1, Form, QC Laboratory Balance Log
- 5.5 G-201, SOP, Equipment Profiles

6.0 Equipment

- 6.1 Top Loading Balance
- 6.2 Check Weight

7.0 Procedure

- 7.1 Use of a top loading balance
 - 7.1.1 Due to the limitations of a top loading balance, top loading balances should only be used when an accurate determination is not needed, i.e. weighing reagents for solution preparations or microbial sample weigh up.
- 7.2 Location and Setup
 - 7.2.1 Top loading balances will be located in a clean area with a level surface, free from vibrations and air currents.
 - 7.2.2 The balance should be allowed to equilibrate to the environment before calibration and use.
 - 7.2.3 The top loading balance should be leveled prior to any calibration or use.
 - 7.2.4 A camel hair brush or equivalent can be used to clean the balance pan of loose debris before each use.
- 7.3 Yearly Calibration
 - 7.3.1 A full calibration is required for each top loading balance annually.

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7.4 Weekly Precision Check

- 7.4.1 An evaluation of precision should be conducted on a weekly basis or after the balance has been moved.
- 7.4.2 Because the standard deviation of measurement is virtually independent of sample mass within the balance's capacity, the use of a small test weight, which may be difficult to handle, is not required.
- 7.4.3 The analyst performing the precision check should record his or her initials and date on the Weekly Precision check form.
- 7.4.4 Document the Ion number, nominal mass, and next calibration due date of the calibration weight used for the Weekly Precision Check.
- 7.4.5 Ensure that the balance is level.
- 7.4.6 Perform ten replicate measurements of the calibration weight.
- 7.4.7 On the balance keypad, print the header for documentation of the date and time of precision check.
- 7.4.8 Remove all objects from the balance pan, allow the reading to stabilize, and tare the balance.
- 7.4.9 Transfer the calibration weight to the balance pan using forceps or static free gloves.
- 7.4.10 Allow the balance reading to stabilize.
- 7.4.11 On the balance keypad, press print to record the weight.
- 7.4.12 Repeat for a total of ten replicate measurements.
- 7.4.13 Affix the weigh tape into the balance logbook.
- 7.4.14 Precision is satisfactory if twice the standard deviation of the weighed value (average of the 10 readings) divided by the desired smallest net weight (i.e., smallest net weight that the users plan to use on that balance), does not exceed 5%. The target smallest net weight should be NLT 1gram for a top loading balance.

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7.5 Minimum weight

7.5.1 Since top loading balances are not to be used for accurate weighing, a minimum weight calculation is not necessary for a top loading balance.

7.6 Balance check

7.6.1 The laboratory balance check will be performed daily before use, using an ASTM E617 traceable Class 4 weight, at minimum. Other top loading balances may require a different weight and class.

7.6.2 The tolerance for the balance check is +/- 1% of the weight stated on the certificate for the weight.

7.7 Logging Calibration Verification

7.7.1 Each balance will have its own logbook, utilizing form D-707-F1 QC Laboratory Balance Log, and identified with the Ion Labs asset ID (refer to SOP G-102 Equipment Profiles for information on asset number assignment). Refer to SOP D-707 Use of Balances in the QC Laboratory.

7.8 Troubleshooting: Causes of Drift

7.8.1 Temperature of the balance and material to be weighed are not the same.

7.8.2 The sample is actively losing or gaining weight.

7.8.3 The balance has been moved and is not equilibrated to the new environment.

7.8.4 Air currents are present in the laboratory.

7.8.5 The balance is not properly leveled.

7.8.6 Laboratory vibrations.

7.8.7 Hysteresis of the mechanical parts occurs during weighing.

7.9 Good Practices

7.9.1 Wear powder free gloves or use plastic forceps to handle weights.

7.9.2 Inspect balance pan for loose debris and remove as necessary before weighing.

7.9.3 Use a weigh boat or weigh paper of the appropriate size to hold all of the material being measured and never measure directly on the balance pan.

7.9.4 Take extra precautions when weighing liquids as not to spill on the balance pan or scale as serious damage could result.

7.9.5 Take extra precautions when weighing materials that are potentially corrosive to the top loading balance as not to spill on balance surfaces. Immediate cleanup is required if material falls outside the weigh boat.

7.10 Weighing Methods

7.10.1 Quantitative Transfer

7.10.1.1 Tare the balance with the weigh container centered on the balance pan.

7.10.1.2 Load the material to the desired weight specification.

7.10.1.3 After the balance has equilibrated document in notebook or on test ticket.

7.10.2 Weight by Difference

7.10.2.1 Tare the balance with the weigh container centered on the balance pan.

7.10.2.2 Load the material to the desired weight specification.

7.10.2.3 After the balance has equilibrated print out the result.

7.10.2.4 Transfer the weighed material to the test vessel.

7.10.2.5 Reweigh the weigh boat.

7.10.2.6 Subtract the weigh boat final weight from the initial material weight to get the transferred weight.

7.10.2.7 Record the results and attach printouts.

8.0 Revision History

Revision	Date	Description of Changes	CCR #	By
0	05/06/10	New	-	-
1	01/24/12	Updated SOP format	-	-
2	02/15/13	Added more troubleshooting information, reformatted for easier interpretation, added more good practice information, expanded responsibility.	13-092	B. Johns
3	02/02/15	Biennial review. Updated SOP format. Expanded responsibilities. Gave specific instruction for the Ohaus SP-020 balance.	15-0134	B. Johns
4	04/04/17	Update SOP to reflect present practices and equipment.	17-0342	B. Johns
5	07/20/20	Update SOP, added information about weighing for quantification.	CC-20-0519	J. Maignan
6	12/03/21	Updated to reflect current practice and requirements. Added reference to SOPs D-707 and G-201.	CC-21-0449	J. Sassman