



**INDIANA DEPARTMENT OF TRANSPORTATION
DIVISION OF MATERIALS AND TESTS**

**VERIFYING BALANCES
ITM No. 910-17**

1.0 SCOPE.

- 1.1 This test method covers the procedures for verifying the accuracy and off-center error of balances.
- 1.2 This ITM may involve hazardous materials, operations, equipment and may not address all of the safety problems associated with the use of the test method. The user of the ITM is responsible for establishing appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.

2.0 REFERENCES.

2.1 AASHTO Standards.

M 231 Weighing Devices Used in the Testing of Materials

3.0 TERMINOLOGY. Definitions for terms and abbreviations will be in accordance with the Department's Standard Specifications, Section 101 and the following:

- 3.1 Accuracy. The degree of conformity of a measurement with the true value of the quantity measured.
- 3.2 Off-Center Errors. The differences in indicated weight when a sample weight is shifted to various positions on the weighing area of the sample pan.
- 3.3 National Institute of Standards and Technology (NIST). A federal technology agency that develops and applies technology, measurements, and standards.

4.0 APPARATUS.

- 4.1 Balance, a Class G2, G5, or G20 in accordance with AASHTO M 231.

Class	Readability and Sensitivity	Accuracy ^a
G2	0.1 g	0.2 g or 0.1 %
G5	1 g	2 g or 0.1 %
G20	5 g	5 g or 0.1 %

^a Accuracy equal to the mass stated or 0.1 % of the test load, whichever is greater, throughout the range of use

4.2 A set of weights up to the capacity of the balance with sufficient subdivisions of weight so that increments of approximately 10 percent of the capacity up to the capacity may be tested. The weights shall be a minimum ASTM Class 3 for use on Class G2 or G5 balances and a minimum of NIST Class F for use on Class G20 balances. The Class 3 or Class F weights shall have a calibration report indicating traceability to NIST. The weights shall be calibrated at a minimum frequency of once each 12 months.

4.3 Thermometer, room temperature, with a resolution of at least 2°F.

5.0 SIGNIFICANCE AND USE. This ITM is used by laboratory personnel to verify the accuracy and off-center error of balances.

6.0 PROCEDURE.

6.1 General. Use the balance in the manner recommended by the manufacturer for each step of the verification procedures.

6.2 Accuracy.

6.2.1 Clean the balance and standard weights with a lint free dry cloth.

6.2.2 Place the standard weights near the instrument.

6.2.3 Allow the balance and the weights to stabilize to the ambient working temperature.

6.2.4 Place the thermometer on the bench near the balance and record the temperature.

6.2.5 Place the standard weight(s) in the center of the balance pan in increasing increments of approximately 10 percent of the capacity and record the indications. If possible, the weights should be carefully stacked upon each other.

6.3 Off-Center Error.

(Note 1: Off-Center Error verification may be waived for balances when the weights cannot be placed directly on the pan of the balance. Example: Ignition ovens.)

6.3.1 Place the standard weight(s) equal to approximately 50 percent of the capacity of the balance on the center of the sample pan and record the indication.

- 6.3.2** Place the same standard weight(s) on each corner of the sample pan and record the indication. For balances with circular pans place the weight(s) toward the edge at 12, 3, 6, and 9 o'clock.
- 6.3.3** Calculate the off center percent error using difference from the weight obtained in 6.3.1 as long as the reading obtained at the center is within the accuracy tolerance.

7.0 TOLERANCES.

7.1 G2 Balance.

- 7.1.1** Within any interval equal to approximately 10 percent of the capacity of the balance, the accuracy shall be equal to 0.2 g or 0.1 percent of the test load, whichever is greater.
- 7.1.2** The maximum off-center error shall be equal to or less than 0.2 g or 0.1 percent of the test load, whichever is greater.

7.2 G5 Balance.

- 7.2.1** Within any interval equal to approximately 10 percent of the capacity of the balance, the accuracy shall be equal to 2 g or 0.1 percent of the test load, whichever is greater.
- 7.2.2** The maximum off-center error shall be equal to or less than 2 g or 0.1 percent of the test load, whichever is greater.

7.3 G20 Balance.

- 7.3.1** Within any interval equal to approximately 10 percent of the capacity of the balance, the accuracy shall be equal to 5 g or 0.1 percent of the test load, whichever is greater.
- 7.3.2** The maximum off-center error shall be equal to or less than 5 g or 0.1 percent of the test load, whichever is greater.

8.0 REPORT. The accuracy and off-center error are reported on the form in Appendix A.

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