



Standard Test Method for Equal Arm Balances¹

This standard is issued under the fixed designation E1270; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

This test method is designed to test balances whose lever-arm ratio is substantially equal to unity. Although largely superseded by new technologies, equal-arm balances retain a special niche for very high precision weighing of larger samples (usually greater than 1 kg) as well as objects with large buoyancy (such as gas bottles). Balances of this type can range from simple instruments of moderate precision (1:10 000) to extremely high precision devices with precision of 1:10 000 000 or better. A number of accessory devices may be included for assisting in the weighing process. These devices may contribute to errors as well as can the basic lever mechanism. This method is designed to test the entire instrument including the accessories.

1. Scope

1.1 This test method can be used for testing equal-arm balances of any capacity and sensitivity. The testing procedure should enable the user to characterize his instrument sufficiently to determine whether or not it is suitable for the purpose for which it is to be used.

1.2 The characteristics to be examined include:

1.2.1 Sensitivity at all loads,

1.2.2 Lever arm ratio,

1.2.3 Damping ratio (for instruments without accessory dampers),

1.2.4 Period of oscillation,

1.2.5 Precision, and

1.2.6 Linearity and calibration of accessory devices that provide on-scale indication of weight.

1.3 *This standard does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

¹ This test method is under the jurisdiction of ASTM Committee E41 on Laboratory Apparatus and is the direct responsibility of Subcommittee E41.06 on Weighing Devices.

Current edition approved Nov. 1, 2014. Published November 2014. Originally approved in 1988. Last previous edition approved in 2008 as E1270–88 (2008). DOI: 10.1520/E1270-88R14.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[E617 Specification for Laboratory Weights and Precision Mass Standards](#)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *capacity*—maximum load recommended by the manufacturer. Usually, the capacity refers to the maximum load on each pan simultaneously.

3.1.2 *readability*—value of the smallest unit of weight which can be read. This may include the estimation of some fraction of a scale division or, in the case of a digital display, will represent the minimum value of the least significant digit.

3.1.3 *sensitivity*—smallest value of weight which will cause a change of indication which can be determined by the user. This may be independent of the readability because of the choice of the reading device used. For example, a magnifying glass may be used in conjunction with a reading scale to observe a sensitivity not readily determined without the magnifying glass.

3.1.4 *precision*—repeatability of the balance indication with the same load under essentially the same conditions. The more closely the measurements are grouped, the smaller the index of precision will be. The precision should be measured under environmental conditions that represent the conditions under which the balance is normally used.

3.1.5 *accuracy*—degree of agreement of the measurement with the true value of the magnitude of the quantity measured.

3.1.6 *linearity*—characteristic of a direct reading device. If a device is linear, calibration at 2 points (for example, 0 and full-scale) calibrates the device (for example, 2 points determine a straight line); if a device is nonlinear, additional points are needed (perhaps a great many).