



Designation: ~~D4753—15~~ D4753 – 24

Standard Guide for Evaluating, Selecting, and Specifying Balances and Standard Masses for Use in Soil, Rock, and Construction Materials Testing¹

This standard is issued under the fixed designation D4753; 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.

1. Scope*

1.1 This guide provides minimum requirements for general-purpose ~~seals, balances, balances~~ and standard masses used in testing soil, rock, and related construction materials.

1.2 This guide provides guidance for evaluating, selecting, and specifying general purpose ~~seals, balances, balances~~ and standard masses used in testing soil, rock, and related construction materials.

1.3 The accuracy requirements for balances ~~and seals~~ are specified in terms of the combined effect of all sources of error contributing to overall balance performance. The measurement of specific sources of error and consideration of details pertaining to balance construction has been intentionally avoided.

1.4 This guide does not include requirements for balances ~~and seals~~ having accuracies greater than those generally required in testing soil, rock, and related construction materials or for research programs or specialized testing requirements.

1.5 This guide does not apply to nongraduated balances.

1.6 This guide does not address the methods used to verify or quantify specific parameters dealing with ~~balances and seals, balances~~. For a description of tests used in evaluating balance performance, see NIST Handbook 44.

1.7 This guide is not intended to be used as a specification for the purchase of ~~balances and seals, balances~~.

NOTE 1—The National Institute of Standards and Technology (NIST), formerly the National Bureau of Standards (NBS), and the International Organization of Legal Metrology (OIML) publish standards or practices that specify construction requirements as well as performance guides for balances. ASTM, OIML, and NIST publish construction standards and tolerances for standard masses.

NOTE 2—The terms “mass” and “determine the mass of” are used in this standard instead of the more commonly used terms “weight” and “weigh” to comply with standard metric practice. In addition, the term “standard mass(es)” is used instead of ~~standard~~ “standard weight(s)” when referring to a piece of material of known specified mass used to compare or measure the mass of other masses.

1.8 The values states in SI units are to be regarded as standard.

¹ This guide is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.95 on Information Retrieval and Data Automation.

Current edition approved ~~May 1, 2015~~ Feb. 1, 2024. Published ~~May 2015~~ March 2024. Originally approved in 1987. Last previous edition approved in 2007~~2015~~ as ~~D4753—07~~ D4753 – 15. DOI: ~~10.1520/D4753-15~~ 10.1520/D4753-24.

*A Summary of Changes section appears at the end of this standard

1.9 This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.

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

1.11 This international standard was developed in accordance with internationally recognized principles on standardization established in the *Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee*.

2. Referenced Documents

2.1 ASTM Standards:²

[D653 Terminology Relating to Soil, Rock, and Contained Fluids](#)

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

2.2 National Institute of Standards and Technology Documents:

[NIST Handbook 44 Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices](#)³

2.3 International Organization for Legal Metrology (OIML):⁴

[International Recommendations OIML R 76-1 and R 76-2 Non-automatic weighing instruments](#)

[Part 1: Metrological and technical requirements—Tests Edition 2006 \(E\) Non-automatic weighing instruments](#)

[Part 2: Test report format Edition 2007 \(E\)](#)

[International Recommendations OIML R 111-1 Edition 2004 \(E\) Weights of classes E₁, E₂, F₁, F₂, M₁, M₁₋₂, M₂, M₂₋₃, and M₃](#)

[Part 1: Metrological and technical requirements](#)

[International Recommendations OIML R 111-2 Edition 2004 \(E\) Weights of classes E₁, E₂, F₁, F₂, M₁, M₁₋₂, M₂, M₂₋₃, and M₃](#)

[Part 2: Test Report Format](#)

~~[International Recommendations OIML R 76-1 and R 76-2 Non-automatic weighing instruments](#)~~

~~[Part 1: Metrological and technical requirements—Test Non-automatic weighing instruments Edition 2006 \(E\)](#)~~

~~[Part 2: Test report format Edition 2007 \(E\)](#)~~

3. Terminology

3.1 *Definitions*—For definitions of terms used in this guide refer to Terminology [D653](#).

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *balance*—*balance, n*—an instrument for determining the mass of an object by the action of gravity on the object. See *scale*.

3.2.1.1 *Discussion*—

In this guide and in common usage, the terms *balance* and *scale* are used interchangeably. The term *balance* is more often used in scientific fields of application. The term *scale* usually refers to instruments intended for commercial or industrial applications; and when so used, usually implies an instrument of lesser performance than a *balance*.

3.2.2 *basic condition*—*condition, n*—a condition that must be met before a basic measurement for evaluating a balance can be performed.

3.2.3 *basic measurement (of error)*—*error, n*—evaluating a balance by determining the change of indication of the balance when

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.

³ Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, <http://www.nist.gov>.

⁴ Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, <http://www.access.gpo.gov> International Organization of Legal Metrology, 11 rue Turgo, 75009 Paris, France, <http://www.oiml.org>.