



Standard Specification for Laboratory Weights and Precision Mass Standards¹

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1. Scope

1.1 This specification covers weights and mass standards used in laboratories, specifically classes 000, 00, 0, 1, 2, 3, 4, 5, 6 and 7. This specification replaces National Bureau of Standards Circular 547, Section 1, which is out of print.

1.2 This specification contains the principal physical characteristics and metrological requirements for weights that are used.

1.2.1 For the verification of weighing instruments;

1.2.2 For the calibration of weights of a lower class of accuracy; and

1.2.3 With weighing instruments.

1.3 Maximum Permissible Errors (formerly tolerances) and design restrictions for each class are described in order that both individual weights or sets of weights can be chosen for appropriate applications.

1.4 The values stated in SI units are to be regarded as standard.

1.5 Weight manufacturers must be able to provide evidence that all new weights comply with specifications in this standard (e.g., material, density, magnetism, surface finish, mass values, uncertainties). Statements of compliance by calibration laboratories during subsequent calibrations must meet the requirements of ISO/IEC 17025, 5.10.4.2 and indicate on the calibration report which sections have or have not been assessed.

2. Referenced Documents

2.1 ISO Standards:²

ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories (2005)

2.2 NIST Standards:³

NIST Handbook 143 State Weights and Measures Laboratories Program Handbook (2007)

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

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² Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, <http://www.iso.org>.

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

NIST SP 811 Guide for the Use of the International System of Unit (SI) 2008 Edition

NIST SP 1038 The International System of Units (SI) – Conversion Factors for General Use (May 2006)

NISTIR 5672 Advanced Mass Calibration and Measurement Assurance Program for State Calibration Laboratories (2012)

NISTIR 6969 Selected Laboratory and Measurement Practices to Support Basic Mass Calibrations (2012)

NIST Technical Note 1297 (1994) Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results

2.3 OIML Standards:⁴

OIML D 28 Conventional Value of the Result of Weighing in Air (2004)

OIML R111–1e04 Weights of classes E1, E2, F1, F2, M1, M1–2, M2, M2–3 and M3 Part 1: Metrological and Technical Requirements (2004)

2.4 BIPM Standards:

VIM: JCGM 200:2012 International Vocabulary of Metrology—Basic and General Concepts and Associated Terms

GUM: JCGM 100:2008 Evaluation of Measurement Data—Guide to the Expression of Uncertainty in Measurement

2.5 EURAMET Standards:

EURAMET/cg-18/V. 3.0 Guidelines on the Calibration of Non-Automatic Weighing Instruments (2011)

2.6 Additional Reference Documents:

CIPM-2007 Revised Formula for the Density of Moist Air, A. Picard, R. S. Davis, M. Glaser, and K. Fujii

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *accuracy class of weights*—a class of weights that meets certain metrological requirements intended to keep the errors within specified limits.

3.1.2 *balance*—instrument indicating apparent mass that is sensitive to the following forces:

⁴ Available from Organisation Internationale de Metrologie Legale, 11 Rue Turgot, 75009 Paris, France.