Division of Measurement Standards
Department of Food and Agriculture

FIELD REFERENCE MANUAL
2012

California Code of Regulation
Title 4, Division 9

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE
DIVISION OF MEASUREMENT STANDARDS

Division of Measurement Standards
Field Reference Manual
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CHAPTER 1.
TOLERANCES AND SPECIFICATIONS FOR COMMERCIAL WEIGHING AND MEASURING DEVICES

Article 1. National Uniformity, Exceptions and Additions

4000. – Application. See Barclays for actual Text

NOTE: This section incorporates the adoption, by reference, of the National Institute of Standards and Technology Handbook 44.

4000.1 – California Type Approval Fees. Each person or business submitting for or seeking approval of a type or design of a weight, measuring, weighing, measuring or counting device or for a design or type of device used for commercial purposes, shall pay to the Department of Food and Agriculture, for deposit into the Food and Agriculture Fund, the following fees:

(a) A nonrefundable application fee in the amount of $500, submitted at the time of application. No evaluation work will begin until this fee is paid.
(b) A deposit based on the evaluator's estimated time and per diem, travel and transportation costs, equipment needed, and type of tests to be performed. Any remaining costs not covered by the deposit(s) shall be charged and collected before the issuance of the Certificate of Approval.
(c) At the time of issuance of a Certificate of Approval, all remaining deposit monies shall be refunded to the applicant.
(d) An application will be considered abandoned after 90 days of inactivity, if an applicant has not paid the required deposit of fees or if the applicant is non-responsive to questions asked or submission of additional information as required to start or finish the type approval process, or for nonpayment of fees within 90 days, and the applicant will be required to reapply and pay the required fees again.

NOTE: Authority cited: Sections 12027, 12107 and 12500.9 Business and Professions Code. Reference: Section 12107 and 12500.9 Business and Professions Code.

4000.2 The fees for type evaluation are as follows:
(a) Evaluator Time. The evaluator hourly rate (Department employee) is $150 per hour. The overtime rate is one and a half times the hourly rate. If a non-Departmental evaluator is used, the applicant will be billed directly at a rate set by them.
(b) Per Diem. The per diem rate shall be the current rate established by the California Department of General Services in the State Administrative Manual.
(c) Travel and Transportation Costs. These shall be the actual round trip costs of transportation for the evaluator to and from the evaluator's home base and the test site, in the event that tests cannot be performed locally. Transportation costs include evaluator's time, airfare, rail or other fare, vehicle rental, tolls, parking and mileage costs.
(d) Equipment.
- (1) Environmental Chamber: $600 per device per full cycle, which includes testing at four different temperatures at three hours per temperature. $300 per device for less than a full cycle.
- (2) Pickup Truck, Van, or other Light Duty Vehicle: $48 per day plus $0.55 per mile.
- (3) Pickup Truck, Van, or other Light Duty Vehicle used for carrying or pulling standards or equipment: $60 per day and $0.72 per mile.
- (4) Heavy Capacity Scale Test Truck, carrying standards up to 20,000 lb: $200 minimum charge, $600 per day, plus $3.60 per mile.
- (5) Liquid Propane Prover Trailer, 25 and 100 gallon sizes: $240 per day.
- (6) Compressed Natural Gas Prover Bottle, (9.33 GGE or 53 lbs.): $120 per day.
- (7) Electric Watt-Hour Meter Test Unit: $100 per day.
- (8) One, Three, or Five Gallon Test Measure: $40 per day per test measure.
- (9) 50 Gallon Prover: $100 per day.
- (10) 305 Gallon Prover: $125 per day.

(11) Gravimetric Test Equipment: $125 per day.
(12) Stillman Bottle: $100 per day.
(13) Nozzle Test Vessel: $75 per evaluation.
(14) Bell Prover: $125 per vapor meter evaluated.
(15) Water Meter Test Bench: $100 per water meter evaluation.
(16) Repetitive Load Tester: $50 per device ≤ 50 lb and $75 per device > 50 lb, per day.
(17) Other unspecified equipment necessary for the evaluation: $100 per day.

(e) Additional Tests: Utility Meters and Load Cells.
(1) Utility Meter Laboratory Throughput: $125 per device for each vapor meter, $20 per day for each water meter, $15 per day for each electric meter.
(2) Load Cell Testing and Equipment: $7,200 per evaluation and $3,600 for each additional evaluation per application.

(f) Certificate fees and other charges.
(1) Certificate of Approval: $750 per application or device, up to two pages.
(2) Additional Pages, Certificate Updates, Amendments: $180 per each page reviewed, modified, or changed.
(3) Letter of Certificate from California Air Resources Board: $300 per device, component, or part reviewed.

NOTE: Authority cited: Sections 12027, 12107 and 12500.9 Business and Professions Code. Reference: Section 12107 and 12500.9 Business and Professions Code.

4000.3 Each person or business having an approved type or design of a weight, measuring, weighing, measuring or counting device or for a design or type of device used for commercial purposes, shall pay to the Department of Food and Agriculture, for deposit into the Food and Agriculture Fund, an annual administrative fee for the reasonable costs incurred for the maintenance of type approval certificates in hard copy and electronic formats of $200 per Certificate. The annual administrative fee shall be paid on the first anniversary after a Certificate is issued, and each year thereafter that the design or type of device is being manufactured.

NOTE: Authority cited: Sections 12027, 12107 and 12500.9 Business and Professions Code. Reference: Section 12107 and 12500.9 Business and Professions Code.

4001. – Exceptions. See Barclays for actual Text

NOTE: The following sections of Handbook 44 are not adopted and are annotated "Not Adopted" in the text:

1.10. General Code.

G-S.1.2. Remanufactured Devices and Remanufactured Main Elements.

G.T.1. Acceptance Tolerances.

(b) **[NOT ADOPTED]**
(c) **[NOT ADOPTED]**
(d) **[NOT ADOPTED]**

2.20. Scales.

S.1.8.3. Customer Indications.

N.3. Minimum Test Weights and Test Loads.

UR.2.6.1. Vehicle Scales.

UR.3.7. Minimum Load on a Vehicle Scale.

3.30. Liquid Measuring Devices.

N.4.1.1. Wholesale Devices Equipped With Automatic Temperature Compensating Systems.

3.31. Vehicle-Tank Meters.

UR.2.2. Ticket Printer; Customer Ticket.

3.32. Liquefied Petroleum Gas and Anhydrous Ammonia Liquid-Measuring Devices.

S.2.6. Automatic Temperature Compensation.

N.4.1.1. Automatic Temperature Compensation.

UR.2.3. Vapor Return Line.

3.33. Hydrocarbon Gas Vapor - Measuring Devices.

S.4.3. Temperature Compensation.

Appendix D. Definitions for:

Remanufactured Devices.

Remanufactured Element.

Repaired Devices.

Repaired Element.

4002. – Additional Requirements. See Barclays for actual Text.

NOTE: These requirements are different than, or in addition to, the requirements of Handbook 44 and are included in the appropriate section of the text. They are shaded, bordered, and numbered in the 4002 series to differentiate them from the Handbook 44 requirements.

4002.1. General Code (1.10.)
(a) Type Approval Use.

4002.2. Scales (2.20.)
(a) Recommended Minimum Test Weights and Test Loads.
(b) Minimum Load on a Vehicle Scale.
(c) Class III, Class III L and Unmarked Devices Used for Recycling.
(d) Livestock Scales Not Equipped with Balance Indicator.
(e) Customer Indications.

4002.3. Vehicle-Tank Meters. (3.31.)
UR.2.2. Ticket Printer; Customer Ticket.

4002.4. Liquefied Petroleum Gas and Anhydrous Ammonia Liquid-Measuring Devices (3.32.)
(a) Temperature Compensation.
(b) Non-applicability of Handbook 44 under certain conditions.
(c) Wholesale Devices Equipped With Automatic Temperature Compensating Systems.
(d) Vapor Return Line.
(e) Signs.

4002.5. Hydrocarbon Gas Vapor-Measuring Devices. (3.33.)

(a) Leak Test
(b) Temperature Compensation
(c) Retention of Customer Invoices

4002.6. Farm Milk Tanks. (4.42.)

(a) Calibration and Installation.

4002.8. Liquid-Measuring Devices. (3.30.)

(a) Wholesale Devices Equipped With Automatic Temperature Compensating Systems.

NOTE: Authority cited: Sections 12027 and 12107, Business and Professions Code. Reference: Section 12107, Business and Professions Code.

Introduction

A. Source.

The specifications, tolerances and other technical requirements in this handbook comprise all of those adopted by the National Conference on Weights and Measures, Inc. (NCWM). NCWM is supported by the National Institute of Standards and Technology (NIST), which provides its Executive Secretary and publishes some of its documents. NIST also develops technical publications for use by weights and measures agencies; these publications may subsequently be endorsed or adopted by NCWM.

The NCWM Committee on Specification and Tolerances (the Committee), acting at the request of the Conference or upon its own initiative, prepares with the technical assistance of the National Institute of Standards and Technology (NIST), proposed amendments or additions to the material adopted by NCWM (see Paragraph C). Such revisions, amendments, or additions are then presented to NCWM as a whole, where they are discussed by weights and measures officials and representatives of interested manufacturers, industries, consumer groups, and others. Eventually the proposals of the Committee, which may have been amended from those originally presented, are voted upon by the weights and measures officials, following the voting procedures in the NCWM Bylaws. A national consensus is required on all items adopted by the NCWM. A specification, tolerance, or other technical requirement is adopted when a majority of the states' representatives, and other voting delegates favoring such adoption, vote for approval.

All of the specifications, tolerances, and other technical requirements given herein are recommended by NCWM for official promulgation in and use by the states in exercising their control of commercial weighing and measuring apparatus. A similar recommendation is made with respect to the local jurisdictions within a state in the absence of the promulgation of specifications, tolerances, and other technical requirements at the state level.

B. Purpose.

The purpose of these technical requirements is to eliminate from use, weights and measures and weighing and measuring devices that give readings that are false, that are of such construction that they are faulty (that is, that are not reasonably permanent in their adjustment or will not repeat their indications correctly), or that facilitate the perpetration of fraud, without prejudice to apparatus that conforms as closely as practicable to the official standards.

C. Amendments.

The Committee on Specifications and Tolerances of the NCWM provides a mechanism for consideration of amendments or additions to the specifications, tolerances, and other technical requirements.

D. Submission of Agenda Items - Preamble.

NCWM Bylaws require that its officers and committees observe the principles of due process for the protection of the rights and interests of affected parties. Specifically, it requires that committees and officers: (a) give reasonable advance notice of contemplated studies, items to be considered for action, and tentative or definite recommendations for conference vote, and (b) provide that all interested parties have an opportunity to be heard.

E. Submission Process.

Anyone introducing an item to the Committee must initially use the regional weights and measures associations to consider its merits. Using the regional associations ensures discussion and evaluation of items at the grassroots level by involving the regional members in the development, evaluation, and justification of proposals. The regions include the Central, Northeastern, Southern, and Western Weights and Measures Associations. For information on the regional associations, visit www.ncwm.net.

To submit a proposal to a regional association, obtain *Form 15: Proposal to Amend Handbooks* at www.ncwm.net or by contacting NCWM via email at info@ncwm.net. Complete the form and submit it electronically in Microsoft Word format to NCWM at info@ncwm.net and copy the Executive Secretary at owm@nist.gov. An example of the Form 15 template is provided at the end of this section. Instructions for completing the form are included with the electronic

version of this template. To ensure that your proposal is included on the regional meeting agenda, submit at least two weeks in advance of the fall regional meeting. Regional meeting schedules are available on the NCWM website.

F. Procedures.

The NCWM Committee will consider items according to the following procedures:

1. NCWM Committees receive new items from regional associations, National Type Evaluation Technical Committees (Sectors), task groups, and subcommittees and as defined in Sections H and I. All items to be considered by the Committee for action at the upcoming Interim Meeting must be submitted electronically in Word format to NCWM by November 1.

2. NCWM will ensure that all committee members and technical advisors receive complete copies of all new items for consideration at the upcoming NCWM Interim Meeting.

G. Criteria for Inclusion on the NCWM Committee's Agenda.

(1) Any item approved by at least one regional association and received by the November 1 deadline will be automatically placed on the Committee's Interim Meeting agenda.

(2) Items that have not been approved by a regional association, but which are received by November 1, will be evaluated by the Committee using the criteria in Section H, Exceptions to Policy and Section I, Committee Agenda.

(3) Any proposal received after the November 1 deadline, but prior to the Interim Meeting, will be evaluated by the Committee according to Section H, Exceptions to Policy and Section I, Committee Agenda. Only those items determined to be a national "priority" will be included on its agenda.

(4) Proposals must be in writing and must include:

(a) a concise statement of the item or problem outlining the purpose and national need for its consideration. An electronic copy of the background material and proposed amendment(s) should be submitted in Microsoft Word format on a CD Rom, DVD, or by electronic mail sent to info@ncwm.net ;

(b) background material including test data, analysis of test data, or other appropriately researched and documented material for the Committee to evaluate when deciding its position or future activity on the proposal;

(c) proposed solutions to problems stated in specific language in amendment form as changes to NCWM documents; and

(d) if a proposal involves a new area of weights and measures activity, practical, realistic, and specific recommendations for laws or regulations to be adopted and test methods to be utilized to provide for proper enforcement.

When proposals are to modify or add requirements to existing publications, such as Handbook 44, the proposal should:

(i) Identify the pertinent portion, section, and paragraph of the existing publication that would be changed (e.g., Section 1.10. General Code, paragraph G-A.1. Commercial and Law-Enforcement Equipment).

(ii) Provide evidence of consistency with other NCWM publications such as with other specific device code sections.

(iii) Provide evidence of consistency with federal laws and regulations (e.g., USDA).

(iv) Relay the positions of businesses, industries, or trade associations affected by the proposal including supporting and opposing points of view.

H. Exceptions to Policy for Submission of Items to a Committee Agenda; Submission of "Priority" Items.

The Committee will use the following criteria to evaluate items that have not been approved by a regional association, but have been received by the November 1 deadline. If an item is received after the November 1 deadline, it will be included on the agenda if the Committee determines that it is a national "priority."

Criteria for Inclusion in the Committee's Agenda when no Regional Association has Approved the Items:

(1) Items must have significant legal impact on weights and measures laws and/or regulations involving:

(a) court cases/attorney general opinions; or

(b) pre-emption by federal statute or regulation; or

(c) conflicts with international standards; or

(d) items which could affect health and safety.

(2) The Committee may contact parties that are potentially affected by an item (e.g., trade associations, industry, and consumer groups) for comments. The Committee may consider these comments and any other information in determining if the item should be included on its agenda.

(3) When the Committee determines that it should consider an item as a "priority" (using the criteria in (1)), the item will be handled in the following manner:

(a) A "priority" item received prior to the Interim Meeting may be added to the Interim Meeting agenda by a majority vote of the Committee.

(b) A "priority" item received after the Interim Meeting may be added to the Committee's Annual Meeting agenda as:

(i) a discussion item by majority vote of the Committee, or

(ii) as a voting item by majority vote of the Committee and the NCWM Board of Directors.

I. Committee Agenda.

(1) The Committee will review items that have been submitted and selected by majority vote to be included on its agenda. The Committee will only include those items that have been:

(a) approved by at least one of the regional associations; or

(b) forwarded by other committees, subcommittees, NTETC Sectors, task forces, or work groups, or those items that meet the criteria in Section H, Exceptions to Policy.

(2) The Committee will publish an agenda (NCWM Publication 15) which identifies the items to be discussed during the Interim Meetings. This agenda shall be distributed to members approximately 30 days prior to the meetings. The agenda will be provided upon request to all other interested parties.

(Amended 1998)

J. Interim Meeting.

(1) The Committee shall hold public hearings at the Interim Meeting for the purpose of discussing and taking comments on all agenda items.

(2) Upon request, the Committee will provide the opportunity for presentations by government officials, industry representatives, consumer groups, or other interested parties during the Interim Meeting. Requests to make presentations must be received by the Committee Chairman or Technical Advisor at least two weeks prior to the start of the meetings.

K. Interim Meeting Report.

(1) Items under consideration by the Committee and about which the Committee offers comments or recommendations to the NCWM to act upon during the Annual Meetings will be included in the Committee's Interim Reports published in the Annual Meeting Program and Committee Reports (NCWM Publication 16).

(2) The Annual Meeting Program and Committee Reports will be prepared and distributed to Conference members approximately three months prior to the NCWM Annual Meeting.

L. Classifications for Agenda Items.

At the Interim Meeting, the Committee can classify proposals in one of the following ways:

(1) as "Voting" – these are items proposed for a vote by the NCWM membership and are indicated with a "V" after the item number in the agenda;

(2) as "Informational" – these are items which require further study, comment, and development and are indicated with an "I" after the item number in the agenda; or

(3) as "Withdrawn" – these are items which will no longer be considered by the Committee and are indicated with a "W" after the item number in the agenda.

M. Developing Items.

In the past the Committee had either carried undeveloped proposals forward as informational, or withdrawn them. Conference members felt that carrying undeveloped informational items on its agenda for years posed an unnecessary drain on NCWM resources. Alternatively, the Conference was also concerned that withdrawing items prematurely resulted in the Committee discarding valuable work that had gone into identifying and presenting the items. The NCWM was also interested in providing a mechanism to inform parties about items that were developing in different localities or in the regional associations.

At the 1998 Annual Meeting, the NCWM established a process for disseminating information on items that may have merit but are insufficiently developed for Committee action. The NCWM established a new "Developing" designation to allow the Committee to notify the submitter that while this item may have merit, it has not been adequately developed for action at the national level. The NCWM agreed that "Developing" items should be submitted by the regional associations with a recommendation that they be presented as "D" items on the national agenda.

The Committees will present "D" items in list format at the end of their report and include a point of contact (including the name and telephone number of the submitter) so that interested parties can obtain additional information. No comments will be taken on a "Developing" item, unless the Committee agrees to receive the new information in advance of the hearing. In these cases, the Chairman will announce in advance that an item will be discussed in the session. The use of this "D" designator is seen as an item management tool, as well as a way to keep the membership informed of emerging items.

N. Comments on Interim Reports.

(1) Weights and measures officials, industry representatives, and all others are encouraged to submit written comments on items in the Committees' Interim Reports.

(2) All comments on the Interim Meeting Report must be submitted to the Committee with a copy to the Executive Secretary no later than one month preceding the opening of the Annual Meeting.

O. Annual Meeting.

(1) The Committee will hold a public hearing at the Annual Meeting to discuss issues on its agenda.

(2) Those who want to speak on an item during the public hearings should request time from the Committee Chairman. The Committee Chairman may impose time limits on presentations, the discussion of a question, or the discussion of a proposed amendment.

P. Final Committee Reports and Conference Action.

(1) Following the public hearings, the Committee will prepare its final report for action by the voting membership of the Conference. Copies of the final report will be provided to the membership prior to the session during which it will be voted on.

(2) The Chairman of the Committee will present the final report of the Committee to the Conference body. A vote will be taken on items, proposals, or sections in the report as circumstances require. The Conference will vote on the entire final report as presented in accordance with established Conference voting procedures. Parliamentary procedure according to Robert's Rules of Order as amended by NCWM Publication No. 1, Bylaws, will be adhered to in the presentation of, and any action on, a Standing Committee report.
(Amended 1998)

Q. System of Paragraph Designation.

In order that technical requirements of a similar nature, or those directed to a single characteristic, may be grouped together in an orderly fashion, and to facilitate the location of individual requirements, the paragraphs of each code are divided into sections. Each section is designated by a letter and a name, and each subsection is given a letter-number designation and a side title.

The letter that appears first in a paragraph designation has a specific meaning, as follows:

G. The letter G is a prefix and indicates that the requirement is part of the **General Code**.

A. Application. These paragraphs pertain to the application of the requirements of a code.

S. Specification. These paragraphs relate to the design of equipment. Specification paragraphs are directed particularly to manufacturers of devices.

N. Note. These paragraphs apply to the official testing of devices.

T. Tolerance. Tolerances are performance requirements. They fix the limit of allowable error or departure from true performance or value.

Sensitivity. The sensitivity requirements, applicable only to nonautomatic-indicating scales, are performance requirements and are lettered with a T.

UR. User Requirement. These paragraphs are directed particularly to the owner and operator of a device. User requirements apply to the selection, installation, use, and maintenance of devices.

D. Definitions of Terms. A definitions section appears in Appendix D to provide the definition of the terms having a special meaning.

The numerical designation after a letter follows the decimal system of paragraph identification that fixes both the relationship and the limitation of the requirements of the paragraph. For example, in the Scales Code, under Specifications, the following numerical designations occur:

S. Specifications

S.1. Design of Indicating and Recording Elements and of Recorded Representations.

- **S.1.1. Zero Indication.**
  - **S.1.1.1. Digital Indicating Elements.**
  - **S.1.1.2. No-Load Reference Value.**
- **S.1.2. Value of Scale Division Units.**
  - **S.1.2.1. Weight Units.**
- **S.1.3. Graduations.**
  - **S.1.3.1. Length.**
  - **S.1.3.2. Width.**
  - **S.1.3.3. Clear Space Between Graduations.**

In this example, paragraphs S.1.1., S.1.2., and S.1.3. are directed and limited to paragraph S.1., which pertains to the design of indicating and recording elements and of recorded representations. Paragraphs S.1.1.1. and S.1.1.2. are directly related to each other, but they are limited to the design of zero indication. Likewise, paragraphs S.1.3.1., S.1.3.2., and S.1.3.3. are directly related to each other, but they are limited to the design of graduations.

This handbook conforms to the concept of primary use of SI (metric) measurements recommended in the Omnibus Trade and Competitiveness Act of 1988 by citing SI metric units before inch-pound units where both units appear together and placing separate sections containing requirements for metric units before corresponding sections containing requirements for customary units. Occasionally, a paragraph or table carries the suffix "M" because the requirement in SI units is shown as a separate statement, rather than combined with the inch-pound units. In these few instances, separate requirements were judged to be more easily understood than attempting to combine SI and inch-pound units in a single paragraph or table. In some cases, however, trade practice is currently restricted to the use of customary units; therefore, some requirements in this handbook will continue to specify only customary units until the Conference achieves a broad consensus on the permitted metric units.

R. Classification of Requirements.

The classification of requirements into "retroactive" and "nonretroactive" status is made in order that the requirements may be put into force and effect without unnecessary hardship and without wholesale condemnation of apparatus. Retroactive requirements are enforceable with respect to all equipment and are printed in upright roman type. Nonretroactive requirements are those that, while clearly desirable, are not so vital that they should at once be enforced with respect to all apparatus. Nonretroactive requirements are printed in ***italic type.***

It is not expected that, after their promulgation in a given jurisdiction, nonretroactive requirements will always remain nonretroactive. It is entirely proper that a weights and measures official, following a careful analysis of existing conditions, fix reasonable periods for the continuance of the nonretroactive application of particular requirements, after which such requirements will become retroactive. These periods should be long enough to avoid undue hardship to the owners or operators of apparatus and, in the case of some requirements, should approximate the average useful life of the apparatus in question.

In order that all interested parties may have timely and ample notice of impending changes in the status of requirements, the following procedure is suggested for the official who plans to change the classification of requirements. If sufficient data are available to make such action feasible, publish in combination with the codes themselves the date or dates at which nonretroactive requirements are to become retroactive. In other cases, give equally effective notice at the earliest practicable date.

A nonretroactive requirement, in italic type, will indicate the year from which it should be enforced and, in some cases, the date the requirement shall be changed to retroactive status. For example, *[Nonretroactive as of 1978 and to become retroactive on January 1, 1985]*. As a general rule, each nonretroactive requirement is reviewed after it has been in effect for 10 years to determine the appropriateness of its nonretroactive status.

S. Using the Handbook.

Handbook 44 is designed to be a working tool for federal, state, and local weights and measures officials, the equipment manufacturers, installers, and service agencies/agents. As noted in General Code paragraph G-A.1. Commercial and Law-Enforcement Equipment, applicable portions of Handbook 44 may be used by the weights and measures official to test noncommercial weighing and measuring equipment upon request. Additionally, applicable language in Handbook 44 may be cited as a standard in noncommercial applications, for example, when the handbook is referenced or cited as part of a quality system or in multiple-party contract agreements where noncommercial weighing or measuring equipment is used.

The section on Fundamental Considerations (Appendix A) should be studied until its contents are well known. The General Code, with general requirements pertaining to all devices, obviously must be well known to a user of the handbook. The makeup of the specific codes, the order of paragraph presentation, and particularly paragraph designation are worthy of careful study.

It is not deemed advisable for a user to attempt to commit to memory tolerances or tolerance tables, even though these are used frequently. For the handbook to serve its purpose, it should be available when any of its requirements are to be applied. Direct reference is the only sure way to apply a requirement properly and to check whether other requirements may be applicable.

This handbook supplies criteria which enable the user to determine the suitability, accuracy, and repetitive consistency of a weighing or measuring device, both in the laboratory and in the field. However, not all code sections can be appropriately applied in both settings. Since some sections are designed to be applied specifically to tests performed under laboratory conditions, it would be impractical or unrealistic to apply them to field tests. Not all tests described in the "Notes" section of the handbook are required to be performed in the field as an official test. An inspector may officially approve or reject a device which has been tested in accordance with those sections applicable to the type of test being conducted.

(Paragraph added 1996)

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Section 1.10. General Code

G-A. Application

G-A.1. Commercial and Law-Enforcement Equipment. – These specifications, tolerances, and other technical requirements apply as follows:

(a) To commercial weighing and measuring equipment; that is, to weights and measures and weighing and measuring devices commercially used or employed in establishing the size, quantity, extent, area, composition (limited to meat and poultry), constituent values (limited to grain), or measurement of quantities, things, produce, or articles for distribution or consumption, purchased, offered, or submitted for sale, hire, or award, or in computing any basic charge or payment for services rendered on the basis of weight or measure.

(Amended 2008)

(b) To any accessory attached to or used in connection with a commercial weighing or measuring device when such accessory is so designed that its operation affects the accuracy of the device.

(c) To weighing and measuring equipment in official use for the enforcement of law or for the collection of statistical information by government agencies.

(These requirements should be used as a guide by the weights and measures official when, upon request, courtesy examinations of noncommercial equipment are made.)

G-A.2. Code Application. – This General Code shall apply to all classes of devices as covered in the specific codes. The specific code requirements supersede General Code requirements in all cases of conflict.

(Amended 1972)

G-A.3. Special and Unclassified Equipment. – Insofar as they are clearly appropriate, the requirements and provisions of the General Code and of specific codes apply to equipment failing, by reason of special design or otherwise, to fall clearly within one of the particular equipment classes for which separate codes have been established. With respect to such equipment, code requirements and provisions shall be applied with due regard to the design, intended purpose, and conditions of use of the equipment.

G-A.4. Metric Equipment. – Employment of the weights and measures of the metric system is lawful throughout the United States. These specifications, tolerances, and other requirements shall not be understood or construed as in any way prohibiting the manufacture, sale, or use of equipment designed to give results in terms of metric units. The specific provisions of these requirements and the principles upon which the requirements are based shall be applied to metric equipment insofar as appropriate and practicable. The tolerances on metric equipment, when not specified herein, shall be equivalent to those specified for similar equipment constructed or graduated in the inch-pound system.

G-A.5. Retroactive Requirements. – "Retroactive" requirements are enforceable with respect to all equipment. Retroactive requirements are printed herein in upright roman type.

G-A.6. Nonretroactive Requirements. – "Nonretroactive" requirements are enforceable after the effective date for devices:

(a) manufactured within a state after the effective date;

(b) both new and used, brought into a state after the effective date;

(c) used in noncommercial applications which are placed into commercial use after the effective date; and

(d) undergoing type evaluation, including devices that have been modified to the extent that a new NTEP Certificate of Conformance (CC) is required.

Nonretroactive requirements are not enforceable with respect to devices that are in commercial service in the state as of the effective date or to new equipment in the stock of a manufacturer or a dealer in the state as of the effective date. [*Nonretroactive requirements are printed in italic type.]*

(Amended 1989 and 2011)

G-A.7. Effective Enforcement Dates of Code Requirements. – Unless otherwise specified, each new or amended code requirement shall not be subject to enforcement prior to January 1 of the year following the adoption by the National Conference on Weights and Measures and publication by the National Institute of Standards and Technology.

G-S. Specifications

G-S.1. Identification. – All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, shall be clearly and permanently marked for the purposes of identification with the following information:

(a) the name, initials, or trademark of the manufacturer or distributor;

(b) a model identifier that positively identifies the pattern or design of the device;

(1) The model identifier shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals, or all lower case.
[Nonretroactive as of January 1, 2003]

(Added 2000) (Amended 2001)

(c) a nonrepetitive serial number, except for equipment with no moving or electronic component parts and not-built-for-purpose, software-based devices;
[Nonretroactive as of January 1, 1968]

(Amended 2003)

(1) The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number.
[Nonretroactive as of January 1, 1986]

(2) Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No., and S. No.).
[Nonretroactive as of January 1, 2001]

(d) the current software version or revision identifier for not-built-for-purpose, software- based devices;
[Nonretroactive as of January 1, 2004]

(Added 2003)

(1) The version or revision identifier shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required version or revision.
[Nonretroactive as of January 1, 2007]

(Added 2006)

(2) Abbreviations for the word "Version" shall, as a minimum, begin with the letter "V" and may be followed by the word "Number." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R" and may be followed by the word "Number." The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.).
[Nonretroactive as of January 1, 2007]

(Added 2006)

(e) an NTEP Certificate of Conformance (CC) number or a corresponding CC Addendum Number for devices that have a CC. The CC Number or a corresponding CC Addendum Number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.).
[Nonretroactive as of January 1, 2003]

The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.
(Amended 1985, 1991, 1999, 2000, 2001, 2003 and 2006)

***G-S.1.1. Location of Marking Information for Not-Built-For-Purpose, Software-Based Devices**. – For not-built-for-purpose, software-based devices either:*

(a) The required information in G-S.1 Identification. (a), (b), (d), and (e) shall be permanently marked or continuously displayed on the device; or

(b) The Certificate of Conformance (CC) Number shall be:

(1) permanently marked on the device;

(2) continuously displayed; or

(3) accessible through an easily recognized menu and, if necessary, a submenu. Examples of menu and submenu identification include, but are not limited to, "Help," "System Identification," "G-S.1. Identification," or "Weights and Measures Identification."

Note: For (b), clear instructions for accessing the information required in G-S.1. (a), (b), and (d) shall be listed on the CC, including information necessary to identify that the software in the device is the same type that was evaluated.
[Nonretroactive as of January 1, 2004]
(Added 2003) (Amended 2006)

G-S.1.2. Remanufactured Devices and Remanufactured Main Elements.

[NOT ADOPTED]

G-S.2. Facilitation of Fraud. – All equipment and all mechanisms, software, and devices attached to or used in conjunction therewith shall be so designed, constructed, assembled, and installed for use such that they do not facilitate the perpetration of fraud.
(Amended 2007)

G-S.3. Permanence. – All equipment shall be of such materials, design, and construction as to make it probable that, under normal service conditions:

(a) accuracy will be maintained,

(b) operating parts will continue to function as intended, and

(c) adjustments will remain reasonably permanent.

Undue stresses, deflections, or distortions of parts shall not occur to the extent that accuracy or permanence is detrimentally affected.

G-S.4. Interchange or Reversal of Parts. – Parts of a device that may readily be interchanged or reversed in the course of field assembly or of normal usage shall be:

(a) so constructed that their interchange or reversal will not affect the performance of the device, or

(b) so marked as to show their proper positions.

G-S.5. Indicating and Recording Elements.

G-S.5.1. General. – All weighing and measuring devices shall be provided with indicating or recording elements appropriate in design and adequate in amount. Primary indications and recorded representations shall be clear, definite, accurate, and easily read under any conditions of normal operation of the device.

G-S.5.2. Graduations, Indications, and Recorded Representations.

G-S.5.2.1. Analog Indication and Representation. – Graduations and a suitable indicator shall be provided in connection with indications designed to advance continuously.

G-S.5.2.2. Digital Indication and Representation. – Digital elements shall be so designed that:

(a) All digital values of like value in a system agree with one another.

(b) A digital value coincides with its associated analog value to the nearest minimum graduation.

(c) A digital value "rounds off" to the nearest minimum unit that can be indicated or recorded.

(d) A digital zero indication includes the display of a zero for all places that are displayed to the right of the decimal point and at least one place to the left. When no decimal values are displayed, a zero shall be displayed for each place of the displayed scale division.
[Nonretroactive as of January 1, 1986]

(Amended 1973 and 1985)

G-S.5.2.3. Size and Character. – In any series of graduations, indications, or recorded representations, corresponding graduations and units shall be uniform in size and character. Graduations, indications, or recorded representations that are subordinate to, or of a lesser value than others with which they are associated, shall be appropriately portrayed or designated.
[Made retroactive as of January 1, 1975]

G-S.5.2.4. Values. – If graduations, indications, or recorded representations are intended to have specific values, these shall be adequately defined by a sufficient number of figures, words, symbols, or combinations thereof, uniformly placed with reference to the graduations, indications, or recorded representations and as close thereto as practicable, but not so positioned as to interfere with the accuracy of reading.

G-S.5.2.5. Permanence. – Graduations, indications, or recorded representations and their defining figures, words, and symbols shall be of such character that they will not tend easily to become obliterated or illegible.

G-S.5.3. Values of Graduated Intervals or Increments. – In any series of graduations, indications, or recorded representations, the values of the graduated intervals or increments shall be uniform throughout the series.

G-S.5.3.1. On Devices That Indicate or Record in More Than One Unit. – On devices designed to indicate or record in more than one unit of measurement, the values indicated and recorded shall be identified with an appropriate word, symbol, or abbreviation.

(Amended 1978 and 1986)

G-S.5.4. Repeatability of Indications. – A device shall be capable of repeating, within prescribed tolerances, its indications and recorded representations. This requirement shall be met irrespective of repeated manipulation of any element of the device in a manner approximating normal usage (including displacement of the indicating elements to the full extent allowed by the construction of the device and repeated operation of a locking or relieving mechanism) and of the repeated performance of steps or operations that are embraced in the testing procedure.

G-S.5.5. Money Values, Mathematical Agreement. – Any recorded money value and any digital money-value indication on a computing-type weighing or measuring device used in retail trade shall be in mathematical agreement with its associated quantity representation or indication to the nearest 1 cent of money value. This does not apply to auxiliary digital indications intended for the operator's use only, when these indications are obtained from existing analog customer indications that meet this requirement.

(Amended 1973)

G-S.5.6. Recorded Representations. – Insofar as they are appropriate, the requirements for indicating and recording elements shall also apply to recorded representations. All recorded values shall be printed digitally.

(Amended 1975)

G-S.5.6.1. Indicated and Recorded Representation of Units. – Appropriate abbreviations.

(a) For equipment manufactured on or after January 1, 2008, the appropriate defining symbols are shown in NIST Special Publication SP 811 "Guide for the Use of International System of Units (SI)" and Handbook 44 Appendix C – General Tables of Units of Measurement.

Note: SP 811 can be viewed or downloaded at http://physics.nist.gov/cuu/pdf/sp811.pdf or by going to http://www.nist.gov/owm and selecting Weights and Measures Publications and the link to Special Publications, Guide for the Use of the International System of Units (SI) (SP 811).

(Added 2007)

(b) The appropriate defining symbols on equipment manufactured prior to January 1, 2008, with limited character sets are shown in Table 1. Representation of SI Units on Equipment Manufactured Prior to January 1, 2008, with Limited Character Sets.

(Added 1977) (Amended 2007)

Table 1. Representation of SI Units on Equipment Manufactured Prior to January 1, 2008, with Limited Character Sets

Name of Unit	International Symbol (common use symbol)	Representation		
		Form I	Form II	
		(double case)	(single case lower)	(single case upper)
Base SI Units				
meter	m	m	m	M
kilogram	kg	kg	kg	KG
Derived SI Units				
newton	N	N	n	N
pascal	Pa	Pa	pa	PA
watt	W	W	w	W
volt	V	V	v	V
degree Celsius	°C	°C	°c	°C
Other Units				
liter	l or L	L	l	L
gram	g	g	g	G
metric ton	t	t	tne	TNE
bar	bar	bar	bar	BAR

(Table Amended 2007)

G-S.5.7. Magnified Graduations and Indications. – All requirements for graduations and indications apply to a series of graduations and an indicator magnified by an optical system or as magnified and projected on a screen.

G-S.6. Marking Operational Controls, Indications, and Features. *– All operational controls, indications, and features, including switches, lights, displays, push buttons, and other means, shall be clearly and definitely identified. The use of approved pictograms or symbols shall be acceptable.*
[Nonretroactive as of January 1, 1977]

(Amended 1978 and 1995)

G-S.7. Lettering. – All required markings and instructions shall be distinct and easily readable and shall be of such character that they will not tend to become obliterated or illegible.

G-S.8. Provision for Sealing Electronic Adjustable Components. *– A device shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism.*
[Nonretroactive as of January 1, 1990]

A device may be fitted with an automatic or a semi-automatic calibration mechanism. This mechanism shall be incorporated inside the device. After sealing, neither the mechanism nor the calibration process shall facilitate fraud.

(Added 1985) (Amended 1989 and 1993)

G-S.8.1. Multiple Weighing or Measuring Elements that Share a Common Provision for Sealing. *– A change to any metrological parameter (calibration or configuration) of any weighing or measuring element shall be individually identified.*
[Nonretroactive as of January 1, 2010]

Note: For devices that utilize an electronic form of sealing, in addition to the requirements in G-S.8.1., any appropriate audit trail requirements in an applicable specific device code also apply. Examples of identification of a change to the metrological parameters of a weighing or measuring element include, but are not limited to:

(1) a broken, missing, or replaced physical seal on an individual weighing, measuring, or indicating element or active junction box;

(2) a change in a calibration factor or configuration setting for each weighing or measuring element;

(3) a display of the date of calibration or configuration event for each weighing or measuring element; or

(4) counters indicating the number of calibration and/or configuration events for each weighing or measuring element.

(Added 2007)

G-N. Notes

G-N.1. Conflict of Laws and Regulations. – If any particular provisions of these specifications, tolerances, and other requirements are found to conflict with existing state laws, or with existing regulations or local ordinances relating to health, safety, or fire prevention, the enforcement of such provisions shall be suspended until conflicting requirements can be harmonized. Such suspension shall not affect the validity or enforcement of the remaining provisions of these specifications, tolerances, and other requirements.

G-N.2. Testing With Nonassociated Equipment. – Tests to determine conditions, such as radio frequency interference (RFI), that may adversely affect the performance of a device shall be conducted with equipment and under conditions that are usual and customary with respect to the location and use of the device.

(Added 1976)

Section 2.20. Scales

A. Application

A.1. General. – This code applies to all types of weighing devices other than automatic bulk-weighing systems, belt-conveyor scales, and automatic weighing systems. The code comprises requirements that generally apply to all weighing devices, and specific requirements that are applicable only to certain types of weighing devices.

(Amended 1972 and 1983)

A.2. Wheel-Load Weighers, Portable Axle-Load Weighers, and Axle-Load Scales. – The requirements for wheel-load weighers, portable axle-load weighers, and axle-load scales apply only to such scales in official use for the enforcement of traffic and highway laws or for the collection of statistical information by government agencies.

A.3. Additional Code Requirements. – In addition to the requirements of this code, devices covered by the Scales code shall meet the requirements of Section 1.10. General Code.

S. Specifications

S.1. Design of Indicating and Recording Elements and of Recorded Representations.

S.1.1. Zero Indication.

(a) On a scale equipped with indicating or recording elements, provision shall be made to either indicate or record a zero-balance condition.

(b) On an automatic-indicating scale or balance indicator, provision shall be made to indicate or record an out-of-balance condition on both sides of zero.

(c) A zero-balance condition may be indicated by other than a continuous digital zero indication, provided that an effective automatic means is provided to inhibit a weighing operation or to return to a continuous digital indication when the scale is in an out-of-balance condition.

(Added 1987) (Amended 1987) (Amended 1993)

S.1.1.1. Digital Indicating Elements.

(a) A digital zero indication shall represent a balance condition that is within ± ½ the value of the scale division.

(b) A digital indicating device shall either automatically maintain a "center-of-zero" condition to ± ¼ scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero-balance condition to ± ¼ of a scale division or less. A "center-of-zero" indication may operate when zero is indicated for gross and/or net mode(s).
[Nonretroactive as of January 1, 1993]

(Amended 1992 and 2008)

S.1.1.2. No-Load Reference Value. – On a single draft manually operated receiving hopper scale installed below grade, used to receive grain, and utilizing a no-load reference value, provision shall be made to indicate and record the no-load reference value prior to the gross load value.

(Added 1983)

S.1.2. Value of Scale Division Units. *– Except for batching scales and weighing systems used exclusively for weighing in predetermined amounts, the value of a scale division "d" expressed in a unit of weight shall be equal to:*

(a) 1, 2, or 5; or

(b) a decimal multiple or submultiple of 1, 2, or 5; or
Examples: scale divisions may be 10, 20, 50, 100; or 0.01, 0.02, 0.05; or 0.1, 0.2, 0.5, etc.

(c) a binary submultiple of a specific unit of weight.

Examples: scale divisions may be ½, ¼, 1/8, 1/16, etc.
[Nonretroactive as of January 1, 1986]

S.1.2.1. Digital Indicating Scales, Units. *– Except for postal scales, a digital-indicating scale shall indicate weight values using only a single unit of measure. Weight values shall be presented in a decimal format with the value of the scale division expressed as 1, 2, or 5, or a decimal multiple or submultiple of 1, 2, or 5.*

The requirement that the value of the scale division be expressed only as 1, 2, or 5, or a decimal multiple or submultiple of only 1, 2, or 5 does not apply to net weight indications and recorded representations that are calculated from gross and tare weight indications where the scale division of the gross weight is different from the scale division of the tare weight(s) on multi-interval or multiple range scales. For example, a multiple range or multi-interval scale may indicate and record tare weights in a lower weighing range (WR) or weighing segment (WS), gross weights in the higher weighing range or weighing segment, and net weights as follows:

55 kg	*Gross Weight*	*(WR2 d = 5 kg)*	*10.05 lb*	*Gross Weight*	*(WS2 d = 0.05 lb)*
– 4 kg	*Tare Weight*	*(WR1 d = 2 kg)*	*– 0.06 lb*	*Tare Weight*	*(WS1 d = 0.02 lb)*
= 51 kg	*Net Weight*	*(Mathematically Correct)*	*= 9.99 lb*	*Net Weight*	*(Mathematically Correct)*

[Nonretroactive as of January 1, 1989]

(Added 1987) (Amended 2008)

S.1.2.2. Verification Scale Interval.

S.1.2.2.1. Class I and II Scales and Dynamic Monorail Scales. If $e \neq d$, the verification scale interval "e" shall be determined by the expression:

$$d < e \leq 10\ d$$

If the displayed division (d) is less than the verification division (e), then the verification division shall be less than or equal to 10 times the displayed division.

The value of e must satisfy the relationship, $e = 10^k$ of the unit of measure, where k is a positive or negative whole number or zero. This requirement does not apply to a Class I device with d < 1 mg where e = 1 mg. If $e \neq d$, the value of "d" shall be a decimal submultiple of "e," and the ratio shall not be more than 10:1. If $e \neq d$, and both "e" and "d" are continuously displayed during normal operation, then "d" shall be differentiated from "e" by size, shape, color, etc. throughout the range of weights displayed as "d."

(Added 1999)

S.1.2.2.2. Class III and IIII Scales. The value of "e" is specified by the manufacturer as marked on the device. Except for dynamic monorail scales, "e" must be less than or equal to "d."

(Added 1999)

S.1.2.3. Prescription Scale with a Counting Feature. – A Class I or Class II prescription scale with an operational counting feature shall not calculate a piece weight or total count unless the sample used to determine the individual piece weight meets the following conditions:

(a) minimum individual piece weight is greater than or equal to 3 e; and

(b) minimum sample piece count is greater than or equal to 10 pieces.

(Added 2003)

(a) *Except on Class I scales, provision shall be made for applying a security seal in a manner that requires the security seal to be broken before an adjustment can be made to any component affecting the performance of an electronic device.*
[Nonretroactive as of January 1, 1979]

(b) *Except on Class I scales, a device shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism.*
[Nonretroactive as of January 1, 1990]

(c) *Except on Class I scales, audit trails shall use the format set forth in Table S.1.11.*
[Nonretroactive as of January 1, 1995]

A device may be fitted with an automatic or a semi-automatic calibration mechanism. This mechanism shall be incorporated inside the device. After sealing, neither the mechanism nor the calibration process shall facilitate fraud.
(Amended 1989, 1991, and 1993)

Table S.1.11. Categories of Device and Methods of Sealing

Categories of Device	***Methods of Sealing***
Category 1: *No remote configuration capability.*	*Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.*
Category 2: *Remote configuration capability, but access is controlled by physical hardware.* *The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode.*	*The hardware enabling access for remote communication must be at the device and sealed using a physical seal or two event counters: one for calibration parameters and one for configuration parameters.*
Category 3: *Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).*	*An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to ten times the number of sealable parameters in the device, but not more than 1000 records are required. (**Note:** Does not require 1000 changes to be stored for each parameter.)*

[Nonretroactive as of January 1, 1995]
(Table added 1993)

S.1.12. Manual Weight Entries. *– A device when being used for direct sale shall accept an entry of a manual gross or net weight value only when the scale gross or net* weight indication is at zero. Recorded manual weight entries, except those on labels generated for packages of standard weights, shall identify the weight value as a manual weight entry by one of the following terms: "Manual Weight," "Manual Wt," or "MAN WT." The use of a symbol to identify multiple manual weight entries on a single document is permitted, provided that the symbol is defined on the same page on which the manual weight entries appear and the definition of the symbol is automatically printed by the recording element as part of the document.*
*[Nonretroactive as of January 1, 1993] [*Nonretroactive as of January 1, 2005]*
(Added 1992) (Amended 2004)

S.1.13. Vehicle On-Board Weighing Systems: Vehicle in Motion. – When the vehicle is in motion, a vehicle on-board weighing system shall either:

(a) be accurate; or

(b) inhibit the weighing operation.

(Added 1993)

S.2. Design of Balance, Tare, Level, Damping, and Arresting Mechanisms.

S.2.1. Zero-Load Adjustment.

S.2.1.1. General. – A scale shall be equipped with means by which the zero-load balance may be adjusted. Any loose material used for this purpose shall be enclosed so that it cannot shift in position and alter the balance condition of the scale.

Except for an initial zero-setting mechanism an automatic zero adjustment outside the limits specified in S.2.1.3. Scales Equipped with an Automatic Zero-Tracking Mechanism is prohibited.
(Amended 2010)

S.2.1.2. Scales used in Direct Sales. – A manual zero-setting mechanism (except on a digital scale with an analog zero-adjustment mechanism with a range of not greater than one scale division) shall be operable or accessible only by a tool outside of and entirely separate from this mechanism, or it shall be enclosed in a cabinet. Except on Class I or II scales, a balance ball shall either meet this requirement or not itself be rotatable.

A semiautomatic zero-setting mechanism shall be operable or accessible only by a tool outside of and separate from this mechanism or it shall be enclosed in a cabinet, or it shall be operable only when the indication is stable within:

(a) plus or minus 3.0 scale divisions for scales of more than 2000 kg (5000 lb) capacity in service prior to January 1, 1981, and for all axle load, railway track, and vehicle scales; or

(b) plus or minus 1.0 scale division for all other scales.

S.2.1.3. Scales Equipped with an Automatic Zero-Tracking Mechanism

S.2.1.3.1. Automatic Zero-Tracking Mechanism for Scales Manufactured Between January 1, 1981, and January 1, 2007. – The maximum load that can be "rezeroed," when either placed on or removed from the platform all at once under normal operating conditions, shall be:

(a) for bench, counter, and livestock scales: 0.6 scale division;

(b) for vehicle, axle-load, and railway track scales: 3.0 scale divisions; and

(c) for all other scales: 1.0 scale division.

(Amended 2005)

S.2.1.3.2. Automatic Zero-Tracking Mechanism for Scales Manufactured on or after January 1, 2007. – The maximum load that can be "rezeroed," when either placed on or removed from the platform all at once under normal operating conditions, shall be:

(a) for vehicle, axle-load, and railway track scales: 3.0 scale divisions; and

(b) for all other scales: 0.5 scale division.

(Added 2005)

S.2.1.3.3. Means to Disable Automatic Zero-Tracking Mechanism on Class III L Devices. – *Class III L devices equipped with an automatic zero-tracking mechanism shall be designed with a sealable means that would allow zero tracking to be disabled during the inspection and test of the device.*
[Nonretroactive as of January 1, 2001]

(Added 1999) (Amended 2005)

Table S.6.3.b.
Notes for Table S.6.3.a. Marking Requirements

10. Necessary to the weighing system but having no metrological effect, e.g., auxiliary remote display, keyboard, etc.

11. *The markings may be either on the load cell or in an accompanying document; except that, if an accompanying document is provided, the serial number shall appear both on the load cell and in the document. [Nonretroactive as of January 1, 1988] The manufacturer's name or trademark, the model designation, and identifying symbols for the model and serial numbers as required by paragraph G-S.1. shall also be marked both on the load cell and in any accompanying document. [Nonretroactive as of January 1, 1991]*

12. Required on the indicating element *and the load-receiving element* of vehicle and axle-load scales. *Such marking shall be identified as "concentrated load capacity" or by the abbreviation "CLC."**
    *[*Nonretroactive as of January 1, 1989]*

    (Amended 2002)

13. *A scale designed for a special application rather than general use shall be conspicuously marked with suitable words, visible to the operator and to the customer, restricting its use to that application, e.g., postal scale, prepack scale, weight classifier, etc.** When a scale is installed with an operational counting feature, the scale shall be marked on both the operator and customer sides with the statement "The counting feature is not legal for trade," except when a Class I or Class II prescription scale complies with all Handbook 44 requirements applicable to counting features.
    *[*Nonretroactive as of 1986]*

    (Amended 1994 and 2003)

14. Required on *livestock** and railway track scales. When marked on vehicle and axle-load scales manufactured before January 1, 1989, it may be used as the CLC. For livestock scales manufactured between January 1, 1989, and January 1, 2003, required markings may be either CLC or section capacity.
    *[*Nonretroactive as of January 1, 2003]*

    (Amended 2002)

15. *Required if the direction of loading the load cell is not obvious.*
    [Nonretroactive as of January 1, 1988]

16. *Serial number [Nonretroactive as of January 1, 1968] and prefix [Nonretroactive as of January 1, 1986].* (See also G-S.1.) Modules without "intelligence" on a modular system (e.g., printer, keyboard module, cash drawer, and secondary display in a point-of-sale system) are not required to have serial numbers.

17. *The accuracy class of a device shall be marked on the device with the appropriate designation as I, II, III, III L, or IIII.*
    [Nonretroactive as of January 1, 1986]

18. The nominal capacity shall be conspicuously marked as follows:
    (a) on any scale equipped with unit weights or weight ranges;
    (b) on any scale with which counterpoise or equal-arm weights are intended to be used;
    (c) on any automatic-indicating or recording scale so constructed that the capacity of the indicating or recording element, or elements, is not immediately apparent;
    (d) on any scale with a nominal capacity less than the sum of the reading elements; and
    *(e) on the load-receiving element (weighbridge) of vehicle, axle-load, and livestock scales.**
    *[*Nonretroactive as of January 1, 1989]*

    (Amended 1992)

19. *For weighing and load-receiving elements not permanently attached to indicating element or covered by a separate CC.*
    [Nonretroactive as of January, 1, 1988]

    (Amended 1992)

20. *Combination vehicle/railway track scales must be marked with both the nominal capacity and CLC for vehicle weighing and the nominal capacity and section capacity for railway weighing. All other requirements relating to these markings will apply.*
    [Nonretroactive as of January 1, 2000]

    (Added 1999)

Table S.6.3.b.
Notes for Table S.6.3.a. Marking Requirements

21. *The value of the load cell verification interval (v_{min}) must be stated in mass units. In addition to this information, a device may be marked with supplemental representations of v_{min}.*
[Nonretroactive as of January 1, 2001]
(Added 1999)

22. *Combination vehicle/livestock scales must be marked with both the CLC for vehicle weighing and the section capacity for livestock weighing. All other requirements relative to these markings will apply.*
[Nonretroactive as of January 1, 2003]
(Added 2002) (Amended 2003)

***Note**: The marked section capacity for livestock weighing may be less than the marked CLC for vehicle weighing.*
(Amended 2003)

23. *Required only if a CC has been issued for the device or equipment. [Nonretroactive as of January 1, 2003]*
(G-S.1. Identification (e) Added 2001)

24. *The section capacity shall be prefaced by the words "Section Capacity" or an abbreviation of that term. Abbreviations shall be "Sec Cap" or "Sec C." All capital letters and periods may be used.*
[Nonretroactive as of January 1, 2005]
(Added 2004)

N. Notes

N.1. Test Procedures.

N.1.1. Increasing-Load Test. – The increasing-load test shall be conducted on all scales with the test loads approximately centered on the load-receiving element of the scale, except on a scale having a nominal capacity greater than the total available known test load. When the total test load is less than the nominal capacity, the test load is used to greatest advantage by concentrating it, within prescribed load limits, over the main load supports of the scale.

N.1.2. Decreasing-Load Test (Automatic Indicating Scales). – The decreasing-load test shall be conducted with the test load approximately centered on the load-receiving element of the scale.

N.1.2.1. Scales Marked I, II, III, or IIII. – Except for portable wheel load weighers, decreasing-load tests shall be conducted on scales marked I, II, III or IIII and with n equal to or greater than 1000 with test loads equal to the maximum test load at each tolerance value. For example, on a Class III scale, at test loads equal to 4000 d, 2000 d, and 500 d; for scales with n less than 1000, the test load shall be equal to one-half of the maximum load applied in the increasing-load test. (See Table 6)
(Amended 1998)

N.1.2.2. All Other Scales. – On all other scales, except for portable wheel load weighers, the decreasing-load test shall be conducted with a test load equal to one-half of the maximum load applied in the increasing-load test.
(Amended 1998)

N.1.3. Shift Test.

N.1.3.1. Dairy-Product Test Scales. – A shift test shall be conducted with a test load of 18 g successively positioned at all points on which a weight might reasonably be placed in the course of normal use of the scale.

Note:

(1) The minimum sample weight is equal to the marked minimum individual piece weight times the marked minimum sample piece count.
(2) Test load as used in this section refers to actual calibration test weights selected from an appropriate test weight class.

(Added 2003)

N.1.11. Substitution Test. – In the substitution test procedure, material or objects are substituted for known test weights, or a combination of known test weights and previously quantified material or objects, using the scale under test as a comparator. Additional test weights or other known test loads may be added to the known test load to evaluate higher weight ranges on the scale.

(Added 2003)

N.1.12. Strain-Load Test. – In the strain-load test procedure, an unknown quantity of material or objects are used to establish a reference load or tare to which test weights or substitution test loads are added.

(Added 2003)

N.2. Verification (Testing) Standards. – Field standard weights used in verifying weighing devices shall comply with requirements of NIST Handbook 105-Series standards (or other suitable and designated standards) or the tolerances expressed in Fundamental Considerations, paragraph 3.2. (i.e., one-third of the smallest tolerance applied).

(Amended 1986)

N.3. Minimum Test Weights and Test Loads. –

[NOT ADOPTED]

N.3.1. Minimum Test-Weight Load and Recommended Strain-Load Test for Railway Track Scales.

(Amended 1990)

N.3.1.1. Approval. – The test-weight load shall be not less than 35 000 kg (80 000 lb). A strain-load test conducted up to the used capacity of the weighing system is recommended.

(Added 1990)

N.3.1.2. Interim Approval. – A test-weight load of not less than 13 500 kg (30 000 lb) and a strain-load test up to at least 25 % of scale capacity may be used to return a scale into service following repairs.

(Added 1990)

Note: The length of time the scale may be used following an interim test is at the discretion of the official with statutory authority.

(Added 1990)

N.3.1.3. Enforcement Action for Inaccuracy. – To take enforcement action on a scale that is found to be inaccurate, a minimum test load of 13 500 kg (30 000 lb) must be used.

(Added 1990)

Table 4.
Minimum Test Weights and Test Loads[1]

Devices in Metric Units			Devices in U.S. Customary Units		
Device Capacity (kg)	**Minimums (in terms of device capacity)**		**Device Capacity (lb)**	**Minimums (in terms of device capacity)**	
	Test Weights (greater of)	**Test Loads[2]**		**Test Weights (greater of)**	**Test Loads[2]**
0 to 150 kg	100 %		0 to 300 lb	100 %	
151 to 1 500 kg	25 % or 150 kg	75 %	301 to 3 000 lb	25 % or 300 lb	75 %
1 501 to 20 000 kg	12.5 % or 500 kg	50 %	3001 to 40 000 lb	12.5 % or 1 000 lb	50 %
20 001 kg+	12.5 % or 5 000 kg	25 %[3]	40 001 lb+	12.5 % or 10 000 lb	25 %[3]

Where practicable:

- Test weights to dial face capacity, 1000 d, or test load to used capacity, if greater than minimums specified.
- During initial verification, a scale should be tested to capacity.

[1] If the amount of test weight in Table 4 combined with the load on the scale would result in an unsafe condition, then the appropriate load will be determined by the official with statutory authority.

[2] The term "test load" means the sum of the combination of field standard test weights and any other applied load used in the conduct of a test using substitution test methods. Not more than three substitutions shall be used during substitution testing, after which the tolerances for strain load tests shall be applied to each set of test loads.

[3] The scale shall be tested from zero to at least 12.5 % of scale capacity using known test weights and then to at least 25 % of scale capacity using either a substitution or strain load test that utilizes known test weights of at least 12.5 % of scale capacity. Whenever practical, a strain load test should be conducted to the used capacity of the scale. When a strain load test is conducted, the tolerances apply only to the test weights or substitution test loads.

(Amended 1988, 1989, 1994, and 2003)

Note: GIPSA requires devices subject to their inspection to be tested to at least "used capacity," which is calculated based on the platform area of the scale and a weight factor assigned to the species of animal weighed on the scale. "Used capacity" is calculated using the formula:

Used Scale Capacity = Scale Platform Area x Species Weight Factor

Where species weight factor = 540 kg/m^2 (110 lb/ft^2) for cattle, 340 kg/m^2 (70 lb/ft^2) for calves and hogs, and 240 kg/m^2 (50 lb/ft^2) for sheep and lambs.

N.3.2. Field Standard Weight Carts. – Field Standard Weight Carts that comply with the tolerances expressed in Fundamental Considerations, paragraph 3.2. (i.e., one-third of the smallest tolerance applied) may be included as part of the minimum required test load (see Table 4) for shift tests and other test procedures.

(Added 2004)

N.4. Coupled-in-Motion Railroad Weighing Systems[1].

N.4.1. Weighing Systems Used to Weigh Trains of Less Than Ten Cars. – These weighing systems shall be tested using a consecutive-car test train consisting of the number of cars weighed in the normal operation run over the weighing system a minimum of five times in each mode of operation following the final calibration.

(Added 1990) (Amended 1992)

N.4.2. Weighing Systems Placed in Service Prior to January 1, 1991, and Used to Weigh Trains of Ten or More Cars. – The minimum test train shall be a consecutive-car test train of no less than ten cars run over the scale a minimum of five times in each mode of operation following final calibration.

(Added 1990) (Amended 1992)

N.4.3. Weighing Systems Placed in Service on or After January 1, 1991, and Used to Weigh Trains of Ten or More Cars.

(a) These weighing systems shall be tested using a consecutive-car test train of no less than ten cars run over the scale a minimum of five times in each mode of operation following final calibration; or

(b) if the official with statutory authority determines it necessary, the As-Used Test Procedures outlined in N.4.3.1. shall be used.

(Added 1990) (Amended 1992)

N.4.3.1. As-Used Test Procedures – A weighing system shall be tested in a manner that represents the normal method of operation and length(s) of trains normally weighed. The weighing systems may be tested using either:

(1) a consecutive-car test train of a length typical of train(s) normally weighed; or

(2) a distributed-car test train of a length typical of train(s) normally weighed.

However, a consecutive-car test train of a shorter length may be used provided that initial verification test results for the shorter consecutive-car test train agree with the test results for the distributed-car or full-length consecutive-car test train as specified in N.4.3.1.1.

The official with statutory authority shall be responsible for determining the minimum test train length to be used on subsequent tests.

(Added 1990) (Amended 1992)

N.4.3.1.1. Initial Verification. – Initial verification tests should be performed on any new weighing system and whenever either the track structure or the operating procedure changes. If a consecutive-car test train of length shorter than trains normally weighed is to be used for subsequent verification, the shorter consecutive-car test train results shall be compared either to a distributed-car or to a consecutive-car test train of length(s) typical of train(s) normally weighed.

The difference between the total train weight of the train(s) representing the normal method of operation and the weight of the shorter consecutive-car test train shall not exceed 0.15 %. If the difference in test results exceeds 0.15 %, the length of the shorter consecutive-car test train shall be increased until agreement within 0.15 % is achieved. Any adjustments to the weighing system based upon the use of a shorter consecutive-car test train shall be offset to correct the bias that was observed between the full-length train test and the shorter consecutive-car test train.

(Added 1990) (Amended 1992 and 1993)

[1] A test weight car that is representative of one of the types of cars typically weighed on the scale under test may be used wherever reference weight cars are specified.

(Added 1991)

N.4.3.1.2. Subsequent Verification. – The test train may consist of either a consecutive-car test train with a length not less than that used in initial verification, or a distributed-car test train representing the number of cars used in the normal operation.

(Added 1990)

N.4.3.1.3. Distributed-Car Test Trains.

(a) The length of the train shall be typical of trains that are normally weighed.

(b) The reference weight cars shall be split into three groups, each group consisting of ten cars or 10 % of the train length, whichever is less.

(Amended 1991)

(c) The test groups shall be placed near the front, around the middle, and near the end of the train.

(d) Following the final adjustment, the distributed-car test train shall be run over the scale at least three times or shall produce 50 weight values, whichever is greater.

(e) The weighing system shall be tested in each mode of operation.
(Added 1990) (Amended 1992)

N.4.3.1.4. Consecutive-Car Test Trains.

(a) A consecutive-car test train shall consist of at least ten cars.

(b) If the consecutive-car test train consists of between ten and twenty cars, inclusive, it shall be run over the scale a minimum of five times in each mode of operation following the final calibration.

(c) If the consecutive-car test train consists of more than twenty cars, it shall be run over the scale a minimum of three times in each mode of operation.

(Added 1990) (Amended 1992)

N.5. Uncoupled-in-Motion Railroad Weighing System. – An uncoupled-in-motion scale shall be tested statically before being tested in motion by passing railroad reference weight cars over the scale. When an uncoupled-in-motion railroad weighing system is tested, the car speed and the direction of travel shall be the same as when the scale is in normal use. The minimum in-motion test shall be three reference weight cars passed over the scale three times. The cars shall be selected to cover the range of weights that are normally weighed on the system and to reflect the types of cars normally weighed.

(Added 1993)

N.6. Nominal Capacity of Prescription Scales. – The nominal capacity of a prescription scale shall be assumed to be one-half apothecary ounce, unless otherwise marked. (Applicable only to scales not marked with an accuracy class.)

T. Tolerances Applicable to Devices <u>not</u> Marked I, II, III, III L, or IIII

T.1. Tolerance Values.

T.1.1. General. – The tolerances applicable to devices not marked with an accuracy class shall have the tolerances applied as specified in Table T.1.1. Tolerances for Unmarked Scales.

(Amended 1990)

T.1.2. Postal and Parcel Post Scales. – The tolerances for postal and parcel post scales are given in Table T.1.1. Tolerances for Unmarked Scales and Table 5. Maintenance and Acceptance Tolerances for Unmarked Postal and Parcel Post Scales.
(Amended 1990)

Table 5.
Maintenance and Acceptance Tolerances for Unmarked Postal and Parcel Post Scales

Scale Capacity (lb)	Test Loads (lb)	Maintenance Tolerance (±) (oz)	Maintenance Tolerance (±) (lb)	Acceptance Tolerance (±) (oz)	Acceptance Tolerance (±) (lb)
0 to 4, inclusive*	0 to 1, inclusive	1/32	0.002	1/32	0.002
	over 1	1/8	0.008	1/16	0.004
over 4*	0 to 7, inclusive	3/16	0.012	3/16	0.012
	7+ to 24, inclusive	3/8	0.024	3/16	0.012
	24+ to 30, inclusive	1/2	0.030	1/4	0.015
	over 30	0.1 % of Test Load		0.05 % of Test Load	

*See Table T.1.1. for scales designed and/or used to weigh loads less than 2 lb.

Table T.1.1. Tolerances for Unmarked Scales						
Type of Device	Subcategory	Min. Tol.	Accept. Tol.	Maint. Tol.	Decreasing Load Multiplier[1]	Other Applicable Requirements
Vehicle, axle-load, livestock, railway track (weighing statically), Crane, and hopper (other than grain hopper)		Class III L, T.N.3.1 (Table 6) and T.N.3.2.			1.0	T.N.2., T.N.3., T.N.4.1., T.N.4.2., T.N.4.3., T.N.4.4., T.N.5., T.N.7.2., *T.N.8.1.4.*[4], T.N.9.
Grain test scales	n ≤ 10 000 n > 10 000	Class III, T.N.3.1. (Table 6) and T.N.3.2. Class II, T.N.3.1. (Table 6) and T.N.3.2.			1.0	*T.N.8.1.4.*[4], T.N.9.
Railway track scales Weighing in motion		T.N.3.6. except that for T.N.3.6.2. (a), no single error shall exceed four times the maintenance tolerance.			1.0	*T.N.8.1.4.*[4], T.N.9.
Monorail Scales, In-Motion		T.N.3.8.			1.0	*T.N.8.1.4.*[4], T.N.9.
Customer-Operated Bulk-Weighing Systems for Recycled Materials		± 5% of applied material test load. Average error on 10 or more test loads ≤ 2.5%.			1.0	*T.N.8.1.4.*[4], T.N.9.
Wheel-load weighers and Portable axle-load Scales	Tested individually or in pairs[2]	0.5d or 50 lb, whichever is greater	1% of test load	2% of test load	1.5[3]	*T.N.8.1.4.*[4], T.N.9.
Prescription scales		0.1 grain (6 mg)	0.1 % of test load load	0.1% of test load	1.5	*T.N.8.1.4.*[4], T.N.9.
Jewelers' scales	Graduated	0.5d	0.05% of test load	0.05% of test load	1.5	*T.N.8.1.4.*[4], T.N.9.
	Ungraduated	Sensitivity or smallest weight, whichever is less				
Dairy-product-test scale	Loads < 18 g 18 g load	0.2 grain 0.2 grain	0.2 grain 0.3 grain	0.2 grain 0.5 grain	1.5	*T.N.8.1.4.*[4], T.N.9.
Postal and parcel post scales Designed/used to weigh loads < 2 lb	Loads < 2 lb	15 grain, 1 g, 1/32 oz, 0.03 oz, or 0.002 lb	15 grain, 1 g, 1/32 oz, 0.03 oz, or 0.002 lb	15 grain, 1 g, 1/32 oz, 0.03 oz, or 0.002 lb	1.5	*T.N.8.1.4.*[4], T.N.9.
	Loads ≥ 2 lb	Table 5	Table 5	Table 5		
Other postal and parcel post scales		Table 5	Table 5	Table 5	1.5	*T.N.8.1.4.*[4], T.N.9.
All other scales	n > 5 000	0.5d or 0.05% of scale capacity, whichever is less	0.05% of test load	0.1% of test load	1.5	T.N.2.5., T.N.4.1., T.N.4.2., T.N.4.3., T.N.5., T.N.7.2., *T.N.8.1.4.*[4], T.N.9.
	n ≤ 5 000	Class III, T.N.3.1., Table 6 and T.N.3.2.			1.0	T.N.2., T.N.3., T.N.4.1., T.N.4.2., T.N.4.3., T.N.5., T.N.7.2., *T.N.8.1.4.*[4], T.N.9.

[1] The decreasing load test applies only to automatic indicating scales.

[2] If marked and tested as a pair, the tolerance shall be applied to the sum of the indications.

[3] The decreasing load test does not apply to portable wheel load weighers.

(Added 1990; Amended 1992 and 1998)

[4] *T.N.8.1.4. Operating Temperature is nonretroactive and effective for unmarked devices manufactured after January 1, 1981.*

T.2. Sensitivity Requirement (SR).

T.2.1. Application. – The sensitivity requirement (SR) is applicable to all nonautomatic-indicating scales not marked I, II, III, III L, or IIII, and is the same whether acceptance or maintenance tolerances apply.

T.2.2. General. – Except for scales specified in paragraphs T.2.3. Prescription Scales through T.2.8. Railway Track Scales: 2 d, 0.2 % of the scale capacity, or 40 lb, whichever is least.

T.2.3. Prescription Scales. 6 mg (0.1 grain).

T.2.4. Jewelers' Scales.

T.2.4.1. With One-Half Ounce Capacity or Less. – 6 mg (0.1 grain).

T.2.4.2. With More Than One-Half Ounce Capacity. – 1 d or 0.05 % of the scale capacity, whichever is less.

T.2.5. Dairy-Product Test Scales.

T.2.5.1. Used in Determining Butterfat Content. – 32 mg (0.5 grain).

T.2.5.2. Used in Determining Moisture Content. – 19 mg (0.3 grain).

T.2.6. Grain Test Scales. The sensitivity shall be as stated in T.N.6. Sensitivity.
(Amended 1987)

T.2.7. Vehicle, Axle-Load, Livestock, and Animal Scales.

T.2.7.1. Equipped With Balance Indicators. – 1 d.

T.2.7.2. Not Equipped With Balance Indicators. – 2 d or 0.2 % of the scale capacity, whichever is less.

4002.2. Scales (2.20)

(d) Livestock Scales Not Equipped With Balance Indicator. The Sensitivity Requirement for livestock scales not equipped with a balance indicator shall be 10 pounds, notwithstanding the requirements of Handbook 44, Section 2.20. Scales, T.2.7.2.

T.3. Sensitivity Requirement, Equilibrium Change Required.

The minimum change in equilibrium with test loads equal to the values specified in T.2. Sensitivity Requirements (SR) shall be as follows:

(a) **Scale with a Trig Loop but without a Balance Indicator.** – The position of rest of the weighbeam shall change from the center of the trig loop to the top or bottom, as the case may be.

(b) **Scale with a Single Balance Indicator and Having a Nominal Capacity of Less Than 250 kg (500 lb).** – The position of rest of the indicator shall change 1.0 mm (0.04 in) or one division on the graduated scale, whichever is greater.

(c) **Scale with a Single Balance Indicator and Having a Nominal Capacity of 250 kg (500 lb) or Greater.** – The position of rest of the indicator shall change 6.4 mm (0.25 in) or one division on the graduated scale or the width of the central target area, whichever is greater. However, the indicator on a batching scale shall change 3.2 mm (0.125 in) or one division on the graduated scale, whichever is greater.

(d) **Scale with Two Opposite-Moving Balance Indicators.** – The position of rest of the two indicators moving in opposite directions shall change 1.0 mm (0.04 in) with respect to each other.

(e) **Scale with Neither a Trig Loop nor a Balance Indicator.** – The position of rest of the weighbeam or lever system shall change from the horizontal, or midway between limiting stops, to either limit of motion.

T.N. Tolerances Applicable to Devices Marked I, II, III, III L, and IIII.

T.N.1. Principles.

T.N.1.1. Design. – The tolerance for a weighing device is a performance requirement independent of the design principle used.

T.N.1.2. Accuracy Classes. – Weighing devices are divided into accuracy classes according to the number of scale divisions (n) and the value of the scale division (d).

T.N.1.3. Scale Division. – The tolerance for a weighing device is related to the value of the scale division (d) or the value of the verification scale division (e) and is generally expressed in terms of d or e.

T.N.2. Tolerance Application.

T.N.2.1. General. – The tolerance values are positive (+) and negative (-) with the weighing device adjusted to zero at no load. When tare is in use, the tolerance values are applied from the tare zero reference (zero net weight indication); the tolerance values apply to the net weight indication for any possible tare load using certified test loads. (Amended 2008)

T.N.2.2. Type Evaluation Examinations. – For type evaluation examinations, the tolerance values apply to increasing and decreasing load tests within the temperature, power supply, and barometric pressure limits specified in T.N.8.

T.N.2.3. Subsequent Verification Examinations. – For subsequent verification examinations, the tolerance values apply regardless of the influence factors in effect at the time of the conduct of the examination. (Also see G-N.2. Testing with Nonassociated Equipment.)

T.N.2.4. Multi-Interval and Multiple Range (Variable Division-Value) Scales. – For multi-interval and multiple range scales, the tolerance values are based on the value of the scale division of the range in use.

T.N.2.5. Ratio Tests. – For ratio tests, the tolerance values are 0.75 of the applicable tolerances.

T.N.3. Tolerance Values.

T.N.3.1. Maintenance Tolerance Values. – The maintenance tolerance values are as specified in Table 6. Maintenance Tolerances.

T.N.3.2. Acceptance Tolerance Values. – The acceptance tolerance values shall be one-half the maintenance tolerance values.

T.N.3.3. Wheel-Load Weighers and Portable Axle-Load Weighers of Class IIII. – The tolerance values are two times the values specified in T.N.3.1. Maintenance Tolerance Values and T.N.3.2. Acceptance Tolerance Values. (Amended 1986)

T.N.3.4. Crane and Hopper (Other than Grain Hopper) Scales. – The maintenance and acceptance tolerances shall be as specified in T.N.3.1. Maintenance Tolerance Values and T.N.3.2. Acceptance Tolerance Values for Class III L, except that the tolerance for crane and construction materials hopper scales shall not be less than 1 d or 0.1 % of the scale capacity, whichever is less. (Amended 1986)

Table 6.
Maintenance Tolerances
(All values in this table are in scale divisions)

Tolerance in Scale Divisions									
	1		**2**		**3**			**5**	
Class	**Test Load**								
I	0 -	50 000	50 001 -	200 000	200 001 +				
II	0 -	5 000	5 001 -	20 000	20 001 +				
III	0 -	500	501 -	2 000	2 001 -	4 000		4 001 +	
IIII	0 -	50	51 -	200	201 -	400		401 +	
III L	0 -	500	501 -	1 000	(Add 1d for each additional 500 d or fraction thereof)				

T.N.3.5. Separate Main Elements: Load Transmitting Element, Indicating Element, Etc. – If a main element separate from a weighing device is submitted for type evaluation, the tolerance for the element is 0.7 that for the complete weighing device. This fraction includes the tolerance attributable to the testing devices used.

T.N.3.6. Coupled-In-Motion Railroad Weighing Systems. – The maintenance and acceptance tolerance values for the group of weight values appropriate to the application must satisfy the following conditions:
(Amended 1990 and 1992)

T.N.3.6.1. – For any group of weight values, the difference in the sum of the individual in-motion car weights of the group as compared to the sum of the individual static weights shall not exceed 0.2 %.
(Amended 1990)

T.N.3.6.2. – If a weighing system is used to weigh trains of five or more cars, and if the individual car weights are used, any single weight value within the group must meet the following criteria:

(a) no single error may exceed three times the static maintenance tolerance;

(b) not more than 5 % of the errors may exceed two times the static maintenance tolerance; and

(c) not more than 35 % of the errors may exceed the static maintenance tolerance.

(Amended 1990 and 1992)

T.N.3.6.3. – For any group of weight values wherein the sole purpose is to determine the sum of the group, T.N.3.6.1. alone applies.
(Amended 1990)

T.N.3.6.4. – For a weighing system used to weigh trains of less than five cars, no single car weight within the group may exceed the static maintenance tolerance.
(Amended 1990 and 1992)

T.N.3.7. Uncoupled-in-Motion Railroad Weighing Systems. – The maintenance and acceptance tolerance values for any single weighment within a group of non-interactive (i.e., uncoupled) loads, the weighment error shall not exceed the static maintenance tolerance.
(Amended 1992)

T.N.3.8. Dynamic Monorail Weighing System. – Acceptance tolerance shall be the same as the maintenance tolerance shown in Table 6. Maintenance Tolerances. On a dynamic test of twenty or more individual test loads, 10 % of the individual test loads may be in error, each not to exceed two times the tolerance. The error on the total of the individual test loads shall not exceed ± 0.2 %. (See also Note in N.1.3.5.1. Dynamic Monorail Weighing

Systems) *For equipment undergoing type evaluation, a tolerance equal to one-half the maintenance tolerance values shown in Table 6. Maintenance Tolerances shall apply.*
[Nonretroactive January 1, 2002]

(Added 1986) (Amended 1999 and 2001)

T.N.3.9. Materials Test on Customer-Operated Bulk Weighing Systems for Recycled Materials. – The maintenance and acceptance tolerance shall be ± 5 % of the applied materials test load except that the average error on ten or more test materials test loads shall not exceed ± 2.5 %.

(Added 1986)

T.N.3.10. Prescription Scales with a Counting Feature. – In addition to Table 6. Maintenance Tolerances (for weight), the indicated piece count value computed by a Class I or Class II prescription scale counting feature shall comply with the tolerances in Table T.N.3.10. Maintenance and Acceptance Tolerances in Excess and in Deficiency for Count.

Table T.N.3.10.
Maintenance and Acceptance Tolerances
in Excess and in Deficiency for Count

Indication of Count	Tolerance (piece count)
0 to 100	0
101 to 200	1
201 or more	0.5 %

(Added 2003)

T.N.3.11. Tolerances for Substitution Test. – Tolerances are applied to the scale based on the substitution test load.

(Added 2003)

T.N.3.12. Tolerances for Strain-Load Test. – Tolerances apply only to the test weights or substitution test loads.

(Added 2003)

T.N.4. Agreement of Indications.

T.N.4.1. Multiple Indicating/Recording Elements. – In the case of a scale or weighing system equipped with more than one indicating element or indicating element and recording element combination, where the indicators or indicator/recorder combination are intended to be used independently of one another, tolerances shall be applied independently to each indicator or indicator/recorder combination.

(Amended 1986)

T.N.4.2. Single Indicating/Recording Element. – In the case of a scale or weighing system with a single indicating element or an indicating/recording element combination, and equipped with component parts such as unit weights, weighbeam and weights, or multiple weighbeams that can be used in combination to indicate a weight, the difference in the weight value indications of any load shall not be greater than the absolute value of the applicable tolerance for that load, and shall be within tolerance limits.

(Amended 1986)

T.N.4.3. Single Indicating Element/Multiple Indications. – In the case of an analog indicating element equipped with two or more indicating means within the same element, the difference in the weight indications for any load other than zero shall not be greater than one-half the value of the scale division (d) and be within tolerance limits.

(Amended 1986)

T.N.4.4. Shift or Section Tests. – The range of the results obtained during the conduct of a shift test or a section test shall not exceed the absolute value of the maintenance tolerance applicable and each test result shall be within applicable tolerances.

(Added 1986)

T.N.4.5. Time Dependence. – A time dependence test shall be conducted during type evaluation and may be conducted during field verification provided test conditions remain constant.

(Amended 1989 and 2005)

T.N.4.5.1. Time Dependence: Class II, III, and IIII Non-automatic Weighing Instruments. – A non-automatic weighing instrument of Classes II, III, and IIII shall meet the following requirements at constant test conditions. During type evaluation, this test shall be conducted at 20 °C ± 2 °C (68 °F ± 4 °F):

(a) When any load is kept on an instrument, the difference between the indication obtained immediately after placing the load and the indication observed during the following 30 minutes shall not exceed 0.5 e. However, the difference between the indication obtained at 15 minutes and the indication obtained at 30 minutes shall not exceed 0.2 e.

(b) If the conditions in (a) are not met, the difference between the indication obtained immediately after placing the load on the instrument and the indication observed during the following 4 hours shall not exceed the absolute value of the maximum permissible error at the load applied.

(Added 2005) (Amended 2006 and 2010)

T.N.4.5.2. Time Dependence: Class III L Non-automatic Weighing Instruments. – A non-automatic weighing instrument of Class III L shall meet the following requirements:

(a) When any load is kept on an instrument, the difference between the indication obtained immediately after placing the load and the indication observed during the following 30 minutes shall not exceed 1.5 e. However, the difference between the indication obtained at 15 minutes and the indication obtained at 30 minutes shall not exceed 0.6 e.

(b) If the conditions in (a) are not met, the difference between the indication obtained immediately after placing the load on the instrument and the indication observed during the following 4 hours shall not exceed the absolute value of the maximum permissible error at the load applied.

(Added 2005) (Amended 2010)

T.N.4.5.3. Zero Load Return: Non-automatic Weighing Instruments. – A non-automatic weighing instrument shall meet the following requirements at constant test conditions. During type evaluation, this test shall be conducted at 20 °C ± 2 °C (68 °F ± 4 °F). The deviation on returning to zero as soon as the indication has stabilized, after the removal of any load which has remained on the instrument for 30 minutes shall not exceed:

(a) 0.5 e for Class II and IIII devices,

(b) 0.5 e for Class III devices with 4000 or fewer divisions,

(c) 0.83 e for Class III devices with more than 4000 divisions, or

(d) one-half of the absolute value of the applicable tolerance for the applied load for Class III L devices.

For a multi-interval instrument, the deviation shall not exceed 0.83 e_1 (where e_1 is the interval of the first weighing segment of the scale).

On a multiple range instrument, the deviation on returning to zero from Max_i (load in the applicable weighing range) shall not exceed 0.83 e_i (interval of the weighing range). Furthermore, after returning to zero from any load greater than Max_1 (capacity of the first weighing range) and immediately after switching to the lowest

weighing range, the indication near zero shall not vary by more than e_1 (interval of the first weighing range) during the following 5 minutes.

(Added 2010)

T.N.4.6. Time Dependence (Creep) for Load Cells During Type Evaluation. – A load cell (force transducer) marked with an accuracy class shall meet the following requirements at constant test conditions:

(a) Permissible Variations of Readings. – With a constant maximum load for the measuring range (D_{max}) between 90 % and 100 % of maximum capacity (E_{max}), applied to the load cell, the difference between the initial reading and any reading obtained during the next 30 minutes shall not exceed the absolute value of the maximum permissible error (mpe) for the applied load (see Table T.N.4.6. Maximum Permissible Error (mpe) for Load Cells During Type Evaluation). The difference between the reading obtained at 20 minutes and the reading obtained at 30 minutes shall not exceed 0.15 times the absolute value of the mpe (see Table T.N.4.6. Maximum Permissible Error (mpe) for Load Cells During Type Evaluation).

(b) Apportionment Factors. – The mpe for creep shall be determined from Table T.N.4.6. Maximum Permissible Error (mpe) * for Load Cells During Type Evaluation using the following apportionment factors (p_{LC}):

p_{LC} = 0.7 for load cells marked with S (single load cell applications),
p_{LC} = 1.0 for load cells marked with M (multiple load cell applications), and
p_{LC} = 0.5 for Class III L load cells marked with S or M.

(Amended 2006)

(Added 2005)

Table T.N.4.6.
Maximum Permissible Error (mpe)* for Load Cells During Type Evaluation

mpe in Load Cell Verifications Divisions (v) = p_{LC} x Basic Tolerance in v			
Class	p_{LC} x 0.5 v	p_{LC} x 1.0 v	p_{LC} x 1.5 v
I	0 - 50 000 v	50 001 v - 200 000 v	200 001 v +
II	0 - 5 000 v	5 001 v - 20 000 v	20 001 v +
III	0 - 500 v	501 v - 2 000 v	2 001 v +
IIII	0 - 50 v	51 v - 200 v	201 v +
III L	0 - 500 v	501 v - 1 000 v	(Add 0.5 v to the basic tolerance for each additional 500 v or fraction thereof up to a maximum load of 10 000 v)

v represents the load cell verification interval
p_{LC} represents the apportionment factors applied to the basic tolerance
p_{LC} = 0.7 for load cells marked with S (single load cell applications)
p_{LC} = 1.0 for load cells marked with M (multiple load cell applications)
p_{LC} = 0.5 for Class III L load cells marked with S or M
* mpe = p_{LC} x Basic Tolerance in load cell verifications divisions (v)

(Table Added 2005) (Amended 2006)

T.N.4.7. Creep Recovery for Load Cells During Type Evaluation. – The difference between the initial reading of the minimum load of the measuring range (D_{min}) and the reading after returning to minimum load subsequent to the maximum load (D_{max}) having been applied for 30 minutes shall not exceed:

(a) 0.5 times the value of the load cell verification interval (0.5 v) for Class II and IIII load cells;

(b) 0.5 times the value of the load cell verification interval (0.5 v) for Class III load cells with 4000 or fewer divisions;

(c) 0.83 times the value of the load cell verification interval (0.83 v) for Class III load cells with more than 4000 divisions; or

(d) 2.5 times the value of the load cell verification interval (2.5 v) for Class III L load cells.

(Added 2006) (Amended 2009 and 2011)

T.N.5. Repeatability. – The results obtained from several weighings of the same load under reasonably static test conditions shall agree within the absolute value of the maintenance tolerance for that load, and shall be within applicable tolerances.

T.N.6. Sensitivity. – This section is applicable to all nonautomatic-indicating scales marked I, II, III, III L, or IIII.

T.N.6.1. Test Load.

(a) The test load for sensitivity for nonautomatic-indicating vehicle, axle-load, livestock, and animal scales shall be 1 d for scales equipped with balance indicator, and 2 d or 0.2 % of the scale capacity, whichever is less, for scales not equipped with balance indicators.

(b) For all other nonautomatic-indicating scales, the test load for sensitivity shall be 1 d at zero and 2 d at maximum test load.

T.N.6.2. Minimum Change of Indications. – The addition or removal of the test load for sensitivity shall cause a minimum permanent change as follows:

(a) for a scale with trig loop but without a balance indicator, the position of the weighbeam shall change from the center to the outer limit of the trig loop;

(b) for a scale with balance indicator, the position of the indicator shall change one division on the graduated scale, the width of the central target area, or the applicable value as shown below, whichever is greater:

Scale of Class I or II: 1 mm (0.04 in),
Scale of Class III or IIII with a maximum capacity of 30 kg (70 lb) or less: 2 mm (0.08 in),
Scale of Class III, III L, or IIII with a maximum capacity of more than 30 kg (70 lb): 5 mm (0.20 in);

(c) for a scale without a trig loop or balance indicator, the position of rest of the weighbeam or lever system shall change from the horizontal or midway between limiting stops to either limit of motion.

(Amended 1987)

T.N.7. Discrimination.

T.N.7.1. Analog Automatic Indicating (i.e., Weighing Device With Dial, Drum, Fan, Etc.). – A test load equivalent to 1.4 d shall cause a change in the indication of at least 1.0 d. (See N.1.5. Discrimination Test)

T.N.7.2. Digital Automatic Indicating. – A test load equivalent to 1.4 d shall cause a change in the indicated or recorded value of at least 2.0 d. This requires the zone of uncertainty to be not greater than three-tenths of the value of the scale division. (See N.1.5.1. Digital Device)

T.N.8. Influence Factors. – The following factors are applicable to tests conducted under controlled conditions only, provided that:

(a) types of devices approved prior to January 1, 1986, and manufactured prior to January 1, 1988, need not meet the requirements of this section,

(b) new types of devices submitted for approval after January 1, 1986, shall comply with the requirements of this section, and

(c) all devices manufactured after January 1, 1988, shall comply with the requirements of this section.

(Amended 1985)

T.N.8.1. Temperature. – Devices shall satisfy the tolerance requirements under the following temperature conditions:

T.N.8.1.1. If not specified in the operating instructions for Class I or II scales, or if not marked on the device for Class III, III L, or IIII scales, the temperature limits shall be: -10 °C to 40 °C (14 °F to 104 °F).

T.N.8.1.2. If temperature limits are specified for the device, the range shall be at least that specified in Table T.N.8.1.2. Temperature Range by Class.

Table T.N.8.1.2.
Temperature Range by Class

Class	Temperature Range
I	5 ºC (9 °F)
II	15 ºC (27 °F)
III, III L, and IIII	30 ºC (54 °F)

T.N.8.1.3. Temperature Effect on Zero-Load Balance. – The zero-load indication shall not vary by more than:

(a) three divisions per 5 °C (9 °F) change in temperature for Class III L devices; or

(b) one division per 5 °C (9 °F) change in temperature for all other devices.

(Amended 1990)

T.N.8.1.4. Operating Temperature. – Except for Class I and II devices, an indicating or recording element shall not display nor record any usable values until the operating temperature necessary for accurate weighing and a stable zero balance condition have been attained.

T.N.8.2. Barometric Pressure. – Except for Class I scales, the zero indication shall not vary by more than one scale division for a change in barometric pressure of 1 kPa over the total barometric pressure range of 95 kPa to 105 kPa (28 in to 31 in of Hg).

T.N.8.3. Electric Power Supply.

T.N.8.3.1. Power Supply, Voltage and Frequency.

(a) Weighing devices that operate using alternating current must perform within the conditions defined in paragraphs T.N.3. Tolerance Values through T.N.7. Discrimination, inclusive, when tested over the range of –15 % to +10 % of the marked nominal line voltage(s) at 60 Hz, or the voltage range marked by the manufacturer, at 60 Hz.

(Amended 2003)

(b) Battery operated instruments shall not indicate nor record values outside the applicable tolerance limits when battery power output is excessive or deficient.

T.N.8.3.2. Power Interruption. – A power interruption shall not cause an indicating or recording element to display or record any values outside the applicable tolerance limits.

T.N.9. Radio Frequency Interference (RFI) and Other Electromagnetic Interference Susceptibility. – The difference between the weight indication due to the disturbance and the weight indication without the disturbance shall not exceed one scale division (d); or the equipment shall:

(a) blank the indication, or

(b) provide an error message, or

(c) the indication shall be so completely unstable that it cannot be interpreted, or transmitted into memory or to a recording element, as a correct measurement value.

The tolerance in T.N.9. Radio Frequency Interference (RFI) and Other Electromagnetic Interference Susceptibility is to be applied independently of other tolerances. For example, if indications are at allowable basic tolerance error limits when the disturbance occurs, then it is acceptable for the indication to exceed the applicable basic tolerances during the disturbance.

(Amended 1997)

UR. User Requirements

UR.1. Selection Requirements. – Equipment shall be suitable for the service in which it is used with respect to elements of its design, including but not limited to, its capacity, number of scale divisions, value of the scale division or verification scale division, minimum capacity, and computing capability.[2]

UR.1.1. General.

(a) For devices marked with a class designation, the typical class or type of device for particular weighing applications is shown in Table 7a. Typical Class or Type of Device for Weighing Applications.

(b) For devices not marked with a class designation, Table 7b. Applicable to Devices not Marked with a Class Designation applies.

[2] Purchasers and users of scales such as railway track, hopper, and vehicle scales should be aware of possible additional requirements for the design and installation of such devices.

(Footnote Added 1995)

Table 7a.
Typical Class or Type of Device for Weighing Applications

Class	Weighing Application or Scale Type
I	Precision laboratory weighing
II	Laboratory weighing, precious metals and gem weighing, grain test scales
III	All commercial weighing not otherwise specified, grain test scales, retail precious metals and semi-precious gem weighing, animal scales, postal scales, vehicle on-board weighing systems with a capacity less than or equal to 30 000 lb, and scales used to determine laundry charges
III L	Vehicle scales, vehicle on-board weighing systems with a capacity greater than 30 000 lb, axle-load scales, livestock scales, railway track scales, crane scales, and hopper (other than grain hopper) scales
IIII	Wheel-load weighers and portable axle-load weighers used for highway weight enforcement

Note: A scale with a higher accuracy class than that specified as "typical" may be used.

(Amended 1985, 1986, 1987, 1988, 1992, and 1995)

Table 7b.
Applicable to Devices not Marked with a Class Designation

Scale Type or Design	Maximum Value of d
Retail Food Scales, 50 lb capacity and less	1 oz
Animal Scales	1 lb
Grain Hopper Scales Capacity up to and including 50 000 lb Capacity over 50 000 lb	 10 lb (not greater than 0.05 % of capacity) 20 lb
Crane Scales	not greater than 0.2 % of capacity
Vehicle and Axle-Load Scales Used in Combination Capacity up to and including 200 000 lb Capacity over 200 000 lb	 20 lb 50 lb
Railway Track Scales With weighbeam Automatic indicating	 20 lb 100 lb
Scales with capacities greater than 500 lb except otherwise specified	0.1 % capacity (but not greater than 50 lb)
Wheel-Lead Weighers	0.25 % capacity (but not greater than 50 lb)

Note: For scales not specified in this table, G-UR.1.1. and UR.1. apply.

(Added 1985) (Amended 1989)

UR.1.2. Grain Hopper Scales. – The minimum number of scale divisions for a Class III Hopper Scale used for weighing grain shall be 2000.

UR.1.3. Value of the Indicated and Recorded Scale Division. *– The value of the scale division as recorded shall be the same as the division value indicated.*
[Nonretroactive as of January 1, 1986]

(Added 1985) (Amended 1999)

UR.1.3.1. Exceptions. – The provisions of UR.1.3.Value of the Indicated and Recorded Scale Division shall not apply to:

(a) Class I scales, or

(b) Dynamic monorail weighing systems when the value of d is less than the value of e.

(Added 1999)

UR.1.4. Grain-Test Scales: Value of the Scale Divisions. – The scale division for grain-test scales shall not exceed 0.2 g for loads through 500 g, and shall not exceed 1 g for loads above 500 g through 1000 g.

(Added 1992)

UR.1.5. Recording Element, Class III L Railway Track Scales. – *Class III L Railway Track Scales must be equipped with a recording element.*
[Nonretroactive as of January 1, 1996]

(Added 1995)

UR.2. Installation Requirements.

UR.2.1. Supports. – A scale that is portable and that is being used on a counter, table, or the floor shall be so positioned that it is firmly and securely supported.

UR.2.2. Suspension of Hanging Scale. – A hanging scale shall be freely suspended from a fixed support when in use.

UR.2.3. Protection From Environmental Factors. – The indicating elements, the lever system or load cells, and the load-receiving element of a permanently installed scale, and the indicating elements of a scale not intended to be permanently installed, shall be adequately protected from environmental factors such as wind, weather, and RFI that may adversely affect the operation or performance of the device.

UR.2.4. Foundation, Supports, and Clearance. – The foundation and supports of any scale installed in a fixed location shall be such as to provide strength, rigidity, and permanence of all components, and clearance shall be provided around all live parts to the extent that no contacts may result when the load-receiving element is empty, nor throughout the weighing range of the scale. *On vehicle and livestock scales, the clearance between the load-receiving elements and the coping at the bottom edge of the platform shall be greater than at the top edge of the platform.*
[Nonretroactive as of January 1, 1973]

UR.2.5. Access to Weighing Elements. – Adequate provision shall be made for ready access to the pit of a vehicle, livestock, animal, axle-load, or railway track scale for the purpose of inspection and maintenance. Any of these scales without a pit shall be installed with adequate means for inspection and maintenance of the weighing elements.

(Amended 1985)

UR.2.6. Approaches.

UR.2.6.1. Vehicle Scales.

[NOT ADOPTED]

UR.2.6.2. Axle-Load Scales. – At each end of an axle-load scale there shall be a straight paved approach in the same plane as the platform. The approaches shall be the same width as the platform and of sufficient length to insure the level positioning of vehicles during weight determinations.

UR.2.7. Stock Racks. – A livestock or animal scale shall be equipped with a suitable stock rack, with gates as required, which shall be securely mounted on the scale platform. Adequate clearances shall be maintained around the outside of the rack.

UR.2.8. Hoists. – On vehicle scales equipped with means for raising the load-receiving element from the weighing element for vehicle unloading, means shall be provided so that it is readily apparent to the scale operator when the load-receiving element is in its designed weighing position.

UR.2.9. Provision for Testing Dynamic Monorail Weighing Systems. *– Provisions shall be made at the time of installation of a dynamic monorail weighing systems for testing in accordance with N.1.3.5.1. Dynamic Monorail Weighing Systems (a rail around or other means for returning the test carcasses to the scale being tested).*
[Nonretroactive as of January 1, 1998]

(Added 1997) (Amended 1999)

UR.3. Use Requirements.

UR.3.1. Recommended Minimum Load. – A recommended minimum load is specified in Table 8 since the use of a device to weigh light loads is likely to result in relatively large errors.

Table 8.
Recommended Minimum Load

Class	Value of Scale Division (d or e*)	Recommended Minimum Load (d or e*)
I	equal to or greater than 0.001 g	100
II	0.001 g to 0.05 g, inclusive	20
	equal to or greater than 0.1 g	50
III	All**	20
III L	All	50
IIII	All	10

*For Class I and II devices equipped with auxiliary reading means (i.e., a rider, a vernier, or a least significant decimal differentiated by size, shape or color), the value of the verification scale division "e" is the value of the scale division immediately preceding the auxiliary means. For Class III and IIII devices the value of "e" is specified by the manufacturer as marked on the device; "e" must be less than or equal to "d."

**A minimum load of 10 d is recommended for a weight classifier marked in accordance with a statement identifying its use for special applications.

(Amended 1990)

UR.3.1.1. Minimum Load, Grain Dockage Determination. – When determining the quantity of foreign material (dockage) in grain, the weight of the sample shall be equal to or greater than 500 scale divisions.

(Added 1985)

UR.3.2. Maximum Load. – A scale shall not be used to weigh a load of more than the nominal capacity of the scale.

UR.3.2.1. Maximum Loading for Vehicle Scales. – A vehicle scale shall not be used to weigh loads exceeding the maximum load capacity of its span as specified in Table UR.3.2.1. Span Maximum Load.

(Added 1996)

Table UR.3.2.1.
Span Maximum Load

Distance in Feet Between the Extremes of any Two or More Consecutive Axles	Ratio of CLC to Maximum Load ("r" factor) Carried on Any Group of Two or More Consecutive Axles.							
	2 axles	3 axles	4 axles	5 axles	6 axles	7 axles	8 axles	9 axles
4[1]	1.000							
5[1]	1.000							
6[1]	1.000							
7[1]	1.000							
8 and less[1]	1.000	1.000						
More than 8[1]	1.118	1.235						
9	1.147	1.257						
10	1.176	1.279						
11	1.206	1.301						
12	1.235	1.324	1.471	1.632				
13	1.265	1.346	1.490	1.651				
14	1.294	1.368	1.510	1.669				
15	1.324	1.390	1.529	1.688	1.853			
16	1.353	1.412	1.549	1.706	1.871			
17	1.382	1.434	1.569	1.724	1.888			
18	1.412	1.456	1.588	1.743	1.906			
19	1.441	1.478	1.608	1.761	1.924			
20	1.471	1.500	1.627	1.779	1.941			
21	1.500	1.522	1.647	1.798	1.959			
22	1.529	1.544	1.667	1.816	1.976			
23	1.559	1.566	1.686	1.835	1.994			
24	1.588	1.588	1.706	1.853	2.012	2.176		
25	1.618	1.610	1.725	1.871	2.029	2.194		
26		1.632	1.745	1.890	2.047	2.211		
27		1.654	1.765	1.908	2.065	2.228		
28		1.676	1.784	1.926	2.082	2.245	2.412	
29		1.699	1.804	1.945	2.100	2.262	2.429	
30		1.721	1.824	1.963	2.118	2.279	2.445	
31		1.743	1.843	1.982	2.135	2.297	2.462	
32		1.765	1.863	2.000	2.153	2.314	2.479	2.647
33			1.882	2.018	2.171	2.331	2.496	2.664
34			1.902	2.037	2.188	2.348	2.513	2.680
35			1.922	2.055	2.206	2.365	2.529	2.697
36			2.000[2]	2.074	2.224	2.382	2.546	2.713
37			2.000[2]	2.092	2.241	2.400	2.563	2.730
38			2.000[2]	2.110	2.259	2.417	2.580	2.746
39			2.000	2.129	2.276	2.434	2.597	2.763
40			2.020	2.147	2.294	2.451	2.613	2.779
41			2.039	2.165	2.312	2.468	2.630	2.796
42			2.059	2.184	2.329	2.485	2.647	2.813
43			2.078	2.202	2.347	2.502	2.664	2.829
44			2.098	2.221	2.365	2.520	2.681	2.846
45			2.118	2.239	2.382	2.537	2.697	2.862
46			2.137	2.257	2.400	2.554	2.714	2.879
47			2.157	2.276	2.418	2.571	2.731	2.895
48			2.176	2.294	2.435	2.588	2.748	2.912
49			2.196	2.313	2.453	2.605	2.765	2.928
50			2.216	2.331	2.471	2.623	2.782	2.945

INSTRUCTIONS:

1. Determine the scale's CLC.
2. Count the number of axles on the vehicle in a given span and determine the distance in feet between the first and last axle in the span.
3. Multiply the CLC by the corresponding multiplier in the table*.
4. The resulting number is the scale's maximum concentrated load for a single span based on the vehicle configuration.

*See note and formula on next page.

Table UR.3.2.1.
Span Maximum Load

Distance in Feet Between the Extremes of any Two or More Consecutive Axles	Ratio of CLC to Maximum Load ("r" factor) Carried on Any Group of Two or More Consecutive Axles.							
	2 axles	3 axles	4 axles	5 axles	6 axles	7 axles	8 axles	9 axles
51			2.235	2.349	2.488	2.640	2.798	2.961
52			2.255	2.368	2.506	2.657	2.815	2.978
53			2.275	2.386	2.524	2.674	2.832	2.994
54			2.294	2.404	2.541	2.691	2.849	3.011
55			2.314	2.423	2.559	2.708	2.866	3.028
56			2.333	2.441	2.576	2.725	2.882	3.044
57			2.353[3]	2.460	2.594	2.742	2.899	3.061
58				2.478	2.612	2.760	2.916	3.077
59				2.496	2.629	2.777	2.933	3.094
60				2.515	2.647	2.794	2.950	3.110

***Note:** This table was developed based upon the following formula. Values may be rounded in some cases for ease of use.

$$W = r \times 500 \left| \left(\frac{LN}{N-1} \right) + 12N + 36 \right|$$

[1] Tandem Axle Weight.

[2] Exception – These values in the third column correspond to the maximum loads in which the inner bridge dimensions of 36, 37, and 38 feet are considered to be equivalent to 39 feet. This allows a weight of 68 000 lb on axles 2 through 5.

[3] Corresponds to the Interstate Gross Weight Limit.

UR.3.3. Single-Draft Vehicle Weighing. – A vehicle or a coupled-vehicle combination shall be commercially weighed on a vehicle scale only as a single draft. That is, the total weight of such a vehicle or combination shall not be determined by adding together the results obtained by separately and not simultaneously weighing each end of such vehicle or individual elements of such coupled combination. However:

(a) the weight of a coupled combination may be determined by uncoupling the various elements (tractor, semitrailer, trailer), weighing each unit separately as a single draft, and adding together the results, or

(b) the weight of a vehicle or coupled-vehicle combination may be determined by adding together the weights obtained while all individual elements are resting simultaneously on more than one scale platform.

Note: This paragraph does not apply to highway-law-enforcement scales and scales used for the collection of statistical data. (Added 1992)

UR.3.4. Wheel-Load Weighing.

UR.3.4.1. Use in Pairs. – When wheel-load weighers or portable axle-load weighers are to be regularly used in pairs, both weighers of each such pair shall be appropriately marked to identify them as weighers intended to be used in combination.

UR.3.4.2. Level Condition. – A vehicle of which either an axle-load determination or a gross-load determination is being made utilizing wheel-load weighers or portable axle-load weighers, shall be in a reasonably level position at the time of such determination.

UR.3.5. Special Designs. – A scale designed and marked for a special application (such as a prepackaging scale or prescription scale with a counting feature) shall not be used for other than its intended purpose[4].

(Amended 2003)

UR.3.6. Wet Commodities. – Wet commodities not in watertight containers shall be weighed only on a scale having a pan or platform that will drain properly.

(Amended 1988)

UR.3.7. Minimum Load on a Vehicle Scale.

[NOT ADOPTED]

4002.2. Scales (2.20.)

(b) Minimum Load on a Vehicle Scale. Except for weighments of ferrous metals, cardboard, paper, rags or plastic, and the weighing of vehicles for registration purposes, a vehicle scale shall not be used for weighing net loads less than the value of 20 scale divisions.

4002.2. Scales (2.20.)

(c) Class III, Class III L and Unmarked Devices Used For Recycling. Except for weighments of ferrous metals, card-board, paper, rags, or plastic, Class III, Class III L and unmarked devices used in recycling shall not be used for weighing net loads less than the value of 20 scale divisions.

UR.3.8. Minimum Load for Weighing Livestock. – A scale with scale divisions greater than 2 kg (5 lb) shall not be used for weighing net loads smaller than 500 d.

(Amended 1989)

UR.3.9. Use of Manual Weight Entries. – Manual gross or net weight entries are permitted for use in the following applications only:

(a) when a point-of-sale system interfaced with a scale is giving credit for a weighed item;

(b) when an item is pre-weighed on a legal for trade scale and marked with the correct net weight;

(c) when a device or system is generating labels for standard weight packages;

(d) when postal scales or weight classifiers are generating manifests for packages to be picked up at a later time; or

[4] Prepackaging scales and prescription scales with a counting feature (and other commercial devices) used for putting up packages in advance of sale are acceptable for use in commerce only if all appropriate provisions of Handbook 44 are met. Users of such devices must be alert to the legal requirements relating to the declaration of quantity on a package. Such requirements are to the effect that, on the average, the contents of the individual packages of a particular commodity comprising a lot, shipment, or delivery must contain at least the quantity declared on the label. The fact that a prepackaging scale may overregister, but within established tolerances, and is approved for commercial service is not a legal justification for packages to contain, on the average, less than the labeled quantity.

(Amended 2003)

(e) when livestock and vehicle scale systems generate weight tickets to correct erroneous tickets.

(Added 1992) (Amended 2000 and 2004)

UR.3.10. Dynamic Monorail Weighing Systems. – When the value of d is different from the value of e, the commercial transaction must be based on e.

(Added 1999)

UR.3.11. Minimum Count. – A prescription scale with an operational counting feature shall not be used to count a quantity of less than 30 pieces weighing a minimum of 90 e.

(Added 2003)

Note: The minimum count as defined in this paragraph refers to the use of the device in the filling of prescriptions and is different from the minimum sample piece count as defined in S.1.2.3. and as required to be marked on the scale by S.6.6.

(Note Added 2004)

UR.3.12. Correct Stored Piece Weight. – For prescription scales with a counting feature, the user is responsible for maintaining the correct stored piece weight. This is especially critical when a medicine has been reformulated or comes from different lots.

(Added 2003)

UR.4. Maintenance Requirements.

UR.4.1. Balance Condition. – The zero-load adjustment of a scale shall be maintained so that, with no load on the load-receiving element and with all load-counterbalancing elements of the scale (such as poises, drop weights, or counterbalance weights) set to zero, the scale shall indicate or record a zero balance condition. A scale not equipped to indicate or record a zero-load balance shall be maintained in balance under any no-load condition.

UR.4.2. Level Condition. – If a scale is equipped with a level-condition indicator, the scale shall be maintained in level.

UR.4.3. Scale Modification. – The dimensions (e.g., length, width, thickness, etc.) of the load receiving element of a scale shall not be changed beyond the manufacturer's specifications, nor shall the capacity of a scale be increased beyond its design capacity by replacing or modifying the original primary indicating or recording element with one of a higher capacity, except when the modification has been approved by a competent engineering authority, preferably that of the engineering department of the manufacturer of the scale, and by the weights and measures authority having jurisdiction over the scale.

(Amended 1996)

UR.5. Coupled-in-Motion Railroad Weighing Systems. – A coupled-in-motion weighing system placed in service on or after January 1, 1991, should be tested in the manner in which it is operated, with the locomotive either pushing or pulling the cars at the designed speed and in the proper direction. The cars used in the test train should represent the range of gross weights that will be used during the normal operation of the weighing system. Except as provided in N.4.2. Weighing Systems Placed in Service Prior to January 1, 1991, and Used to Weigh Trains of Ten or More Cars and N.4.3.(a) Weighing Systems Placed in Service on or After January 1, 1991, and Used to Weigh Trains of Ten or More Cars, normal operating procedures should be simulated as nearly as practical. Approach conditions for a train length in each direction of the scale site are more critical for a weighing system used for individual car weights than for a unit-train-weights-only facility, and should be considered prior to installation.

(Added 1990) (Amended 1992)

N.2.3. Minimum Test Load. – Except for applications where a normal weighment is less than 10 minutes, the minimum test load shall not be less than the largest of the following values.

(d) 800 scale divisions,

(e) the load obtained at maximum flow rate in one revolution of the belt, or

(f) at least 10 minutes of operation.

For applications where a normal weighment is less than 10 minutes (e.g., belt-conveyor systems used exclusively to issue net weights for material conveyed by individual vehicles and railway track cars) the minimum test load shall be the normal weighment that also complies with (a) and (b).

The official with statutory authority may determine that a smaller minimum totalized load down to 2 % of the load totalized in 1 hour at the maximum flow rate may be used for subsequent tests, provided that:

1. the smaller minimum totalized load is greater than the quantities specified in (a) and (b), and

2. consecutive official testing with the minimum totalized loads described in N.2.3. (a), (b), or (c) and the smaller minimum test load has been conducted that demonstrates the system complies with applicable tolerances for repeatability, acceptance, and maintenance.

(Added 2004) (Amended 2008)

N.3. Test Procedures.

N.3.1. Zero-Load Tests. – A zero-load test shall be conducted to establish that the belt scale system (including the conveyor) is capable of holding a stable, in-service zero.

(Amended 1989 and 2002)

N.3.1.1. Determination of Zero. – A "zero-load test" is a determination of the error in zero, expressed as an internal reference, a percentage of the full-scale capacity, or a change in a totalized load over a whole number of complete belt revolutions. For belt-conveyor scales with electronic integrators, the test must be performed over a period of at least 3 minutes and with a whole number of complete belt revolutions. For belt-conveyor scales with mechanical integrators, the test shall be performed with no less than three complete revolutions or 10 minutes of operation, whichever is greater.

(Added 2002)

N.3.1.2. Test of Zero Stability. – The conveyor system shall be operated to warm up the belt and the belt scale shall be zero adjusted as required. A series of zero-load tests shall be carried out immediately before conducting the simulated load or materials test until the three consecutive zero-load tests each indicate an error which does not exceed ± 0.06 % of the totalized load at full scale capacity for the duration of the test. No adjustments can be made during the three consecutive zero-load test readings.

(Added 2002) (Amended 2004 and 2009)

N.3.1.3. Check for Consistency of the Conveyor Belt along Its Entire Length. – During a zero-load test with any operational low-flow lock-out disabled, the absolute value of the difference between the maximum and minimum totalizer readings indicated on the totalizer during any complete revolution of the belt shall not exceed 0.12 % of the minimum test load.

Note: The end value of the zero-load test must meet the ± 0.06 % requirement referenced in the "Test for Zero Stability."
(Added 2002) (Amended 2004 and 2011)

N.3.2. Material Tests. – Material tests should be conducted using actual belt loading conditions. These belt loading conditions shall include, but are not limited to conducting materials tests using different belt loading points, all types and sizes of products weighed on the scale, at least one other belt speed, and in both directions of weighing.

On initial verification, at least three individual material tests shall be conducted. On subsequent verifications, at least two individual tests shall be conducted. The results of all these tests shall be within the tolerance limits.

Either pass a quantity of pre-weighed material over the belt-conveyor scale in a manner as similar as feasible to actual loading conditions, or weigh all material that has passed over the belt-conveyor scale. Means for weighing the material test load will depend on the capacity of the belt-conveyor scale and availability of a suitable scale for the test. To assure that the test load is accurately weighed and determined, the following precautions shall be observed:

(a) The containers, whether railroad cars, trucks, or boxes, must not leak, and shall not be overloaded to the point that material will be lost.

(b) The actual empty or tare weight of the containers shall be determined at the time of the test. Stenciled tare weight of railway cars or trucks shall not be used. Gross and tare weights shall be determined on the same scale.

(c) When a pre-weighed test load is passed over the scale, the belt-loading hopper shall be examined before and after the test to assure that the hopper is empty and that only the material of the test load has passed over the scale.

(d) Where practicable, a reference scale should be tested within 24 hours preceding the determination of the weight of the test load used for a belt-conveyor scale material test.

A reference scale which is not "as found" within maintenance tolerance should have its accuracy re-verified after the belt-conveyor test with a suitable known weight load if the "as found" error of the belt-conveyor scale material test exceeds maintenance tolerance values.

(e) If any suitable known weight load other than a certified test weight load is used for re-verification of the reference scale accuracy, its weight shall be determined on the reference scale after the reference scale certification and before commencing the belt scale material test.

(f) The test shall not be conducted if the weight of the test load has been affected by environmental conditions.

Note: Even if the reference scale is within maintenance tolerance it may require adjusting to be able to meet paragraph N.3.2.1. Accuracy of Material.

(Amended 1986, 1989, 1998, 2000, and 2002)

N.3.2.1. Accuracy of Material. – The quantity of material used to conduct a material test shall be weighed on a reference scale to an accuracy within 0.1 %. Scales typically used for this purpose include Class III and III L scales or a scale without a class designation as described in Handbook 44, Section 2.20., Table T.1.1. Tolerances for Unmarked Scales.

(Added 1989) (Amended 1991, 1993, 1998 and 2000)

N.3.3. Simulated Load Tests.

(a) As required by the official with statutory authority, simulated load tests as recommended by the manufacturer are to be conducted between material tests to monitor the system's operational performance, but shall not be used for official certification.

(Amended 1991)

(b) A simulated load test consisting of at least three consecutive test runs shall be conducted as soon as possible, but not more than 12 hours after the completion of the material test, to establish the factor to relate the results of the simulated load test to the results of the material tests.

(Added 1990)

(c) The results of the simulated load test shall repeat within 0.1 %.

(Added 1990)

(Amended 1989 and 1990)

S.2.5.1. Automatic Temperature Compensation for Refined Petroleum Products. – A device may be equipped with an automatic means for adjusting the indication and registration of the measured volume of product to the volume at 15 °C for liters or the volume at 60 °F for gallons and decimal subdivisions or fractional equivalents thereof where not prohibited by state law.

S.2.5.2. Provision for Deactivating. – On a device equipped with an automatic temperature-compensating mechanism that will indicate or record only in terms of liters compensated to 15 °C or gallons compensated to 60 °F, provision shall be made for deactivating the automatic temperature-compensating mechanism so the meter can indicate and record, if it is equipped to record, in terms of the uncompensated volume.

S.2.5.3. Gross and Net Indications. – A device equipped with automatic temperature compensation shall indicate or record, if equipped to record, both the gross (uncompensated) and net (compensated) volume for testing purposes. It is not necessary that both net and gross volume be displayed simultaneously.

S.2.5.4. Provision for Sealing Automatic Temperature-Compensating Systems. – Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that an automatic temperature-compensating system cannot be disconnected and no adjustment may be made to the system.

S.2.5.5. Temperature Determination with Automatic Temperature Compensation. – For test purposes, means shall be provided (e.g., thermometer well) to determine the temperature of the liquid either:

(a) in the liquid chamber of the meter, or

(b) immediately adjacent to the meter in the meter inlet or discharge line.

(Added 2007)

S.2.6. Thermometer Well, Temperature Determination. *For test purposes, means shall be provided (e.g., thermometer well) to determine the temperature if the liquid either in the:*

(a) liquid chamber of the meter; or

(b) meter inlet or discharge line immediately adjacent to the meter.

[Nonretroactive as of January 1, 2012)

(Added 2011)

S.3. Design of Discharge Lines and Discharge Line Valves.
(Not applicable to milk-metering systems.)

S.3.1. Diversion of Measured Liquid. – Except on equipment used exclusively for fueling aircraft, no means shall be provided by which any measured liquid can be diverted from the measuring chamber of the meter or the discharge line thereof. However, two or more delivery outlets may be installed if means is provided to insure that:

(a) liquid can flow from only one such outlet at one time, and

(b) the direction of flow for which the mechanism may be set at any time is definitely and conspicuously indicated.

S.3.2. Pump-Discharge Unit. – On a pump-discharge unit, the discharge hose shall be of the wet-hose type with a shutoff valve at its outlet end. However, a pump-discharge unit may be equipped also with a dry-hose without a shutoff valve at its outlet end, but only if:

(a) the dry-hose is as short as practicable, and

(b) there is incorporated in the discharge piping, immediately adjacent to the meter, effective means to insure that liquid can flow through only one of the discharge hoses at any one time and that the meter and the wet-hose remain full of liquid at all times.

S.3.3. Gravity-Discharge Unit. – On a gravity-discharge unit, the discharge hose or equivalent pipe shall be of the dry-hose type with no shutoff valve at its outlet end. The dry-hose shall be of such stiffness and only of such length as to facilitate its drainage. The inlet end of the hose or of an equivalent outlet pipe shall be of such height as to provide for proper drainage of the hose or pipe. There shall be incorporated an automatic vacuum breaker or equivalent means to prevent siphoning and to insure the rapid and complete drainage.

S.3.4. Discharge Hose. – A discharge hose shall be adequately reinforced.

S.3.5. Discharge Valve. – A discharge valve may be installed in the discharge line only if the device is of the wet-hose type, in which case such valve shall be at the discharge end of the line. Any other shutoff valve on the discharge side of the meter shall be of the automatic or semiautomatic predetermined-stop type or shall be operable only:

(a) by means of a tool (but not a pin) entirely separate from the device, or

(b) by mutilation of a security seal with which the valve is sealed open.

S.3.6. Antidrain Valve. – In a wet-hose, pressure-type device, an effective antidrain valve shall be incorporated in the discharge valve or immediately adjacent thereto. The antidrain valve shall function so as to prevent the drainage of the discharge hose. However, a device used exclusively for fueling and defueling aircraft may be of the pressure type without an antidrain valve.

S.4. Design of Intake Lines (for Milk-Metering Systems).

S.4.1. Diversion of Liquid to be Measured. – No means shall be provided by which any liquid can be diverted from the supply tank to the receiving tank without being measured by the device.

S.4.2. Intake Hose. – The intake hose shall be:

(a) of the dry-hose type;

(b) adequately reinforced;

(c) not more than 6 m (20 ft) in length, unless it can be demonstrated that a longer hose is essential to permit pickups from a supply tank; and

(d) connected to the pump at horizontal or above, to permit complete drainage of the hose.

S.5. Marking Requirements.

S.5.1. Limitation of Use. – If a meter is intended to measure accurately only liquids having particular properties, or to measure accurately only under specific installation or operating conditions, or to measure accurately only when used in conjunction with specific accessory equipment, these limitations shall be clearly and permanently stated on the meter.

S.5.2. Discharge Rates. – A meter shall be marked to show its designed maximum and minimum discharge rates. However, the minimum discharge rate shall not exceed 20 % of the maximum discharge rate.

Note: See example in Section 3.30. Liquid-Measuring Devices Code, paragraph S.4.4.1. Discharge Rates. (Added 2003)

S.5.3. Measuring Components, Milk-Metering System. – All components that affect the measurement of milk that are disassembled for cleaning purposes shall be clearly and permanently identified with a common serial number.

S.5.4. Flood Volume, Milk-Metering System. – When applicable, the volume of product necessary to flood the system when dry shall be clearly, conspicuously, and permanently marked on the air eliminator.

S.5.5. Conversion Factor. – When the conversion factor of 1.03 kg/L (8.6 lb/gal) is used to convert the volume of milk to weight, the conversion factor shall be clearly marked on the primary indicating element and recorded on the delivery ticket.

(Added 1989)

S.5.6. Temperature Compensation for Refined Petroleum Products. – If a device is equipped with an automatic temperature compensator, the primary indicating elements, recording elements, and recorded representations shall be

clearly and conspicuously marked to show the volume delivered has been adjusted to the volume at 15 °C for liters or the volume at 60 °F for gallons and decimal subdivisions or fractional equivalents thereof.

(Added 2007)

S.5.7. Meter Size. *– Except for milk meters, if the meter model identifier does not provide a link to the meter size (in terms of pipe diameter) on an NTEP Certificate of Conformance, the meter shall be marked to show meter size. [Non-retroactive as of January 1, 2009]*

(Added 2008)

N. Notes

N.1. Test Liquid.

(a) A measuring system shall be tested with the liquid to be commercially measured or with a liquid of the same general physical characteristics. Following a satisfactory examination, the weights and measures official should attach a seal or tag indicating the product used during the test.

(Amended 1975)

(b) A milk-measuring system shall be tested with the type of milk to be measured when the accuracy of the system is affected by the characteristics of milk (e.g., positive displacement meters).

(Part (b) Added 1989)

N.2. Evaporation and Volume Change. – Care shall be exercised to reduce to a minimum, evaporation losses and volume changes resulting from changes in temperature of the test liquid.

N.3. Test Drafts. – Test drafts should be equal to at least the amount delivered by the device in 1 minute at its maximum discharge rate, and shall in no case be less than 180 L (50 gal) or 225 kg (500 lb).

(Amended 1989)

N.4. Testing Procedures.

N.4.1. Normal Tests. – The "normal" test of a measuring system shall be made at the maximum discharge rate that may be anticipated under the conditions of the installation. Any additional tests conducted at flow rates down to and including one-half of the sum of the maximum discharge flow rate and the rated minimum discharge flow rate shall be considered normal tests.

(Amended 1992)

N.4.1.1. Milk Measuring System. – The "normal" test shall include a determination of the effectiveness of the air elimination system.

N.4.1.2. Repeatability Tests. – Tests for repeatability should include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors such as, temperature pressure and flow rate are reduced to the extent that they will not affect the results obtained.

(Added 2001)

N.4.1.3. Automatic Temperature-Compensating Systems for Refined Petroleum Products. – On devices equipped with automatic temperature-compensating systems, normal tests shall be conducted:

(a) by comparing the compensated volume indicated or recorded to the actual delivered volume corrected to 15 °C for liters or 60 °F for gallons and decimal subdivisions or fractional equivalents thereof; and

(b) with the temperature-compensating system deactivated, comparing the uncompensated volume indicated or recorded to the actual delivered volume.

The first test shall be performed with the automatic temperature-compensating system operating in the "as-found" condition. On devices that indicate or record both the compensated and uncompensated volume for each delivery, the tests in (a) and (b) may be performed as a single test.

(Added 2007)

N.4.2. Special Tests (Except Milk-Measuring Systems). – "Special" tests shall be made to develop the operating characteristics of a measuring system and any special elements and accessories attached to or associated with the device. Any test except as set forth in N.4.1. Normal Tests and N.4.5. Product Depletion Test shall be considered a special test. Special tests of a measuring system shall be made at a minimum discharge rate of 20 % of the marked maximum discharge rate or at the minimum discharge rate marked on the device, whichever is less.

(Amended 1978 and 2005)

N.4.3. Antidrain Valve Test. – The effectiveness of the antidrain valve shall be tested after the pump pressure in the measuring system has been released and a valve between the supply tank and the discharge valve is closed.

N.4.4. System Capacity. – The test of a milk-measuring system shall include the verification of the volume of product necessary to flood the system as marked on the air eliminator.

N.4.5. Product Depletion Test. – Except for vehicle-mounted metering systems used solely for the delivery of aviation fuel, the effectiveness of the vapor eliminator or vapor elimination means shall be tested by dispensing product at the normal flow rate until the product supply is depleted and continuing until the lack of fluid causes the meter indication to stop completely for at least 10 seconds. If the meter indication fails to stop completely for at least 10 seconds, continue to operate the system for 3 minutes. Finish the test by switching to another compartment with sufficient product to complete the test on a multi-compartment vehicle or by adding sufficient product to complete the test to a single compartment vehicle. When adding product to a single compartment vehicle, allow appropriate time for any entrapped vapor to disperse before continuing the test. Test drafts shall be of the same size and run at approximately the same flow rate.

(Added 2005)

N.5. Temperature Correction for Refined Petroleum Products. – Corrections shall be made for any changes in volume resulting from the differences in liquid temperatures between the time of passage through the meter and the time of volumetric determination in the prover. When adjustments are necessary, appropriate petroleum measurement tables should be used.

(Added 2007)

T. Tolerances

T.1. Application.

T.1.1. To Underregistration and to Overregistration. – The tolerances hereinafter prescribed shall be applied to errors of underregistration and errors of overregistration.

T.2. Tolerance Values. – Tolerances shall be as shown in Table 1. Accuracy Classes and Tolerances for Vehicle-Tank Meters. and Table 2. Tolerances for Vehicle-Mounted Milk Meters.

(Amended 1995)

S.3. Design of Compartment Discharge Manifold. – When two or more compartments discharge through a common manifold or other single outlet, effective means shall be provided to ensure:

(a) that liquid can flow through the delivery line leading from only one compartment at one time and that flow of liquid from one compartment to any other is automatically prevented, or

(b) that all compartments will discharge simultaneously.

If the discharge valves from two or more compartments are automatically controlled so that they can only be operated together, thus effectively connecting these compartments to one another, such compartments shall, for purposes of this paragraph, be construed to be one compartment.

S.4. Marking of Compartments.

S.4.1. Compartment Identification. – Each compartment of a multiple-compartment tank shall be conspicuously identified by a letter or number marked on the dome or immediately below the fill opening. Such letters or numbers shall be in regular sequence from front to rear, and the delivery faucets or valves shall be marked to correspond with their respective compartments.

S.4.2. Compartment Capacity, Single Indicator. – A compartment provided with a single indicator shall be clearly, permanently, and conspicuously marked with a statement of its capacity as defined by its indicator.

S.4.3. Compartment Capacity, Multiple Indicators. – A compartment provided with two or more indicators shall be clearly, permanently, and conspicuously marked with a statement identifying:

(a) each indicator by a letter or number; and

(b) immediately adjacent to each letter or number, the capacity of the compartment as defined by the particular indicator.

N. Notes

N.1. Test Liquid. – Water or light fuel oil shall be used as the test liquid for a vehicle-tank compartment.

N.2. Evaporation and Volume Change. – Care shall be exercised to reduce to a minimum, evaporation losses and volume changes resulting from changes in temperature of the test liquid.

N.3. To Deliver. – A vehicle-tank compartment shall be gauged "to deliver." If the compartment is gauged by measuring the test liquid into the tank, the inside tank walls shall first be thoroughly wetted.

N.4. Gauging of Compartments. – When a compartment is gauged to determine the proper position for an indicator or to determine what a capacity marking should be, whether on a new vehicle tank or following repairs or modifications that might affect compartment capacities, tolerances are not applicable, and the indicator shall be set and the compartment capacity shall be marked as accurately as practicable.

N.5. Adjustment and Remarking. – When a compartment is found upon test to have an error in excess of the applicable tolerance, the capacity of the compartment shall be adjusted to agree with its marked capacity, or its marked capacity shall be changed to agree with its capacity as determined by the test.

T. Tolerances

T.1. Application.

T.1.1. To Excess and to Deficiency. – The tolerances hereinafter prescribed shall be applied to errors in excess and in deficiency.

T.2. Tolerance Values. – Maintenance and acceptance tolerances shall be as shown in Table 1. Maintenance and Acceptance Tolerances on Vehicle-Tank Compartments.

Table 1.
Maintenance and Acceptance Tolerances
on Vehicle-Tank Compartments

Nominal Capacity of Compartment	**Maintenance and Acceptance Tolerances**	
gallons	**Expressed in quarts**	**Expressed in gallons**
200 or less	2	0.5
201 to 400, inclusive	3	0.75
401 to 600, inclusive	4	1.0
601 to 800, inclusive	5	1.25
801 to 1000, inclusive	6	1.50
over 1000	Add 1 quart per 200 gallons or fraction thereof	Add 0.25 gallon per 200 gallons or fraction thereof

UR. User Requirements

UR.1. Conditions of Use.

UR.1.1. Filling. – A vehicle shall stand upon a level surface during the filling of a compartment.

UR.1.2. Delivering. – During a delivery, a vehicle shall be so positioned as to assure complete emptying of a compartment. Each compartment shall be used for an individual delivery only; that is, an individual delivery shall consist of the entire contents of a compartment or compartments.

(Amended 1976)

0.8 mm (0.03125 in or 1/32 in). The graduations shall not be less than 0.12 mm (0.005 in) in width, and the clear interval between adjacent edges of successive graduations shall be not less than 0.4 mm (0.015625 in or 1/64 in).

S.3.7.2. Values of Graduations. – On a gauge rod or surface gauge, the graduations may be designated in inches or in centimeters and fractions thereof, or may be identified in a numerical series without reference to inches or centimeters or fractions thereof. In either case, a volume chart shall be provided for each such rod or gauge and each tank with which it is associated, showing values in terms of the graduation on the rod or gauge. If a rod or gauge is associated with but one tank, in lieu of linear or numerical series graduations and volume chart, values in terms of volume of liquid in the tank may be shown directly on the rod or gauge.

S.3.7.3. Value of Graduated Interval. – The value of a graduated interval on a gauge rod or surface gauge (exclusive on the interval from the bottom of the tank to the lowest graduation) shall not exceed:

(a) 2 L for a tank of a nominal capacity of 1000 L or less; ½ gal for a tank of a nominal capacity of 250 gal or less;

(b) 4 L for a tank of a nominal capacity of 1001 L to 2000 L, inclusive; 1 gal for a tank of a nominal capacity of 251 gal to 500 gal, inclusive,

(c) 6 L for a tank of a nominal capacity of 2001 L to 6000 L, inclusive; 1½ gal for a tank of a nominal capacity of 501 gal to 1500 gal, inclusive,

(d) 8 L for a tank of a nominal capacity of 6001 L to 10 000 L, inclusive; 2 gal for a tank of a nominal capacity of 1501 gal to 2500 gal, inclusive,

(e) 8 L plus 4 L for each additional 10 000 L or fraction thereof, for tanks of nominal capacity above 10 000 L or 2 gal plus 1 gal for each additional 2500 gal or fraction thereof, for tanks with nominal capacity above 2500 gal.

(Amended 1980)

S.3.8. Design of Indicating Means on Tanks with a Capacity Greater than 8000 Liters or 2000 Gallons. *– Any farm milk tank with a capacity greater than 8000 L, or 2000 gal, shall be equipped with an external gauge assembly. [Nonretroactive and applicable only to tanks manufactured after January 1, 1981]*

(Added 1980)

S.4. Design of Volume Chart.

S.4.1. General. – A volume chart shall show volume values only, *over the entire range of the volume of the tank from 5 % of capacity or 2 m^3 (500 gal) whichever is less, to its maximum capacity.** All letters and figures on the chart shall be distinct and easily readable. The chart shall be substantially constructed, and the face of the chart shall be so protected that its lettering and figures will not tend easily to become obliterated or illegible.
*[*Nonretroactive as of January 1, 1986]*

(Amended 1985)

S.4.2. For a Tank of 1000 Liters, or 250 Gallons, or Less. – The volume chart for a tank of nominal capacity of 1000 L, or 250 gal, or less shall show values at least to the nearest 1 L, or ¼ gal.

S.4.3. For a Tank of 1001 Liters to 2000 Liters, or 251 to 500 Gallons. – The volume chart for a tank of nominal capacity of 1001 L to 2000 L, or 251 gal to 500 gal, inclusive, shall show values at least to the nearest 2 L, or ½ gal.

S.4.4. For a Tank of Greater than 2000 Liters, or 500 Gallons. – The volume chart for a tank of nominal capacity of greater than 2000 L, or 500 gal, shall show values at least to the nearest gallon, or 4 L.

(Amended 1980)

S.5. Gauging.

S.5.1. Level. – A farm milk tank shall be level, as shown by the level-indicating means, during the original gauging operation.

S.5.2. To Deliver. – A farm milk tank shall be originally gauged "to deliver." If the tank is gauged by measuring the test liquid into the tank, the inside tank walls shall first be thoroughly wetted and the tank shall then be drained for 30 seconds after the main drainage flow has ceased.

S.5.3. Preparation of Volume Chart. – When a tank is gauged for the purposes of preparing a volume chart, tolerances are not applicable, and the chart shall be prepared as accurately as practicable.

S.6. Identification. – A tank and any gauge rod, surface gauge, spirit level, and volume chart intended to be used therewith shall be mutually identified, as by a common serial number, in a prominent and permanent manner.

N. Notes

N.1. Test Liquid. – Water shall be used as the test liquid for a farm milk tank.

N.2. Evaporation and Volume Change. – Care shall be exercised to reduce to a minimum, evaporation losses and volume changes resulting from changes in temperature of the test liquid.

N.3. To Deliver. – A farm milk tank shall be tested "to deliver." If the tank is gauged by measuring the test liquid delivered into the tank, the inside tank walls shall first be thoroughly wetted and the tank then shall be drained for 30 seconds after the main drainage flow has ceased.

N.4. Level. – A farm milk tank shall be level, as shown by the level-indicating means, during gauging and testing.

N.5. Test Methods. – Acceptance tests of milk tanks may be of either the prover method or the master meter method provided that the master metering system is capable of operating within 25 % of the applicable tolerance found in T.3. Basic Tolerance Values. Subsequent tests may be of either the prover method or the master meter method provided that the master metering system is capable of operating within 25 % of the applicable tolerance found in T.4. Basic Tolerance Values, Master Meter Method.

N.5.1. Verification of Master Metering Systems. – A master metering system used to gauge a milk tank shall be verified before and after the gauging process. A master metering system used to calibrate a milk tank shall be verified before starting the calibration and re-verified at least every quarter of the tank capacity, or every 2000 L (500 gal), whichever is greater. The above process of re-verifying the master metering system may be waived if the system is verified using a NIST traceable prover with a minimum of two tests immediately before and one test immediately after the gauging process and that each test result is within 25 % of T.3. Basic Tolerance Values.

(Added 2001)(Amended 2012)

N.5.2. Temperature Changes in Water Supply. – When using a master metering system to gauge or calibrate a milk tank, the official shall monitor the temperature of the water before and after changing sources of supply. If the water temperature of the new source changes by more than 2.8 °C (5 °F) from the previous supply, the official shall reverify the accuracy of the master metering system as soon as possible after the system reaches temperature equilibrium with the new supply source.

(Added 2001)

N.6. Reading the Meniscus. – When a reading or setting is to be obtained from a meniscus formed by milk or other opaque liquid, the index or reading line is the position of the highest point of the center of the meniscus. When calibrating a device with water and the device is to be used with an opaque liquid, the reading should be obtained accordingly; that is, the position of the highest point of the center of the meniscus.

(Added 1984)

T. Tolerances

T.1. Application. – The tolerances hereinafter prescribed shall be applied equally to errors in excess and errors in deficiency.

T.2. Minimum Tolerance Values. – On a particular tank, the maintenance and acceptance tolerance applied shall be not smaller than the volume corresponding to the graduated interval at the point of test draft on the indicating means or 2 L (½ gal), whichever is greater.

(Amended 1980)

T.3. Basic Tolerance Values. – The basic maintenance and acceptance tolerance shall be 0.2 % of the volume of test liquid in the tank at each test draft.

(Amended 1975)

T.4. Basic Tolerance Values, Master Meter Method. – The basic maintenance and acceptance tolerance for tanks tested by the master meter method shall be 0.4 % of the volume of test liquid in the tank at each test draft.

(Added 1975)

UR. User Requirements

UR.1. Installation. – A stationary tank shall be rigidly installed in level without the use of removable blocks or shims under the legs. If such tank is not mounted permanently in position, the correct position on the floor for each leg shall be clearly and permanently defined.

UR.2. Level Condition.

UR.2.1. Stationary Tank. – A stationary farm milk tank shall be maintained in level.

UR.2.1.1. Leveling Lugs. – If leveling lugs are provided on a stationary tank, such lugs shall not be hammered or filed to establish or change a level condition of the tank.

UR.2.2. Portable Tank. – On a portable tank, measurement readings shall be made only when the tank is approximately level; that is, when it is not out of level by more than 5 % or approximately three degrees in any direction.

UR.3. Weight Chart. – An auxiliary weight chart may be provided, on which shall be prominently displayed the weight per unit volume value used to derive the weight values from the official volume chart.

UR.4. Use. – A farm milk tank shall not be used to measure quantities greater than an amount that can be agitated without overflowing.

4002.7. Farm Milk Tanks.

(a) Calibration at Installation. Any farm milk tank exceeding 1,000 gallons capacity installed or relocated after January 1, 1982 shall be calibrated at the farm and a volume chart prepared before the acceptance test is performed.

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Units of Area[14]

144 square inches (in^2)	= 1 square foot (ft^2)
9 square feet	= 1 square yard (yd^2)
	= 1296 square inches
272¼ square feet	= 1 square rod (rd^2)
160 square rods	= 1 acre = 43 560 square feet
640 acres	= 1 square mile (mi^2)
1 mile square	= 1 section of land
6 miles square	= 1 township
	= 36 sections = 36 square miles

Units of Volume[3]

1728 cubic inches (in^3)	= 1 cubic foot (ft^3)
27 cubic feet	= 1 cubic yard (yd^3)

Gunter's or Surveyors Chain Units of Measurement

0.66 foot (ft)	= 1 link (li)
100 links	= 1 chain (ch)
	= 4 rods = 66 feet
80 chains	= 1 U. S. statute mile (mi)
	= 320 rods = 5280 feet

Units of Liquid Volume[15]

4 gills (gi)	= 1 pint (pt) = 28.875 cubic inches (in^3)
2 pints	= 1 quart (qt) = 57.75 cubic inches
4 quarts	= 1 gallon (gal) = 231 cubic inches
	= 8 pints = 32 gills

Apothecaries Units of Liquid Volume

60 minims	= 1 fluid dram (fl dr or $\mathfrak{f}$ 3)
	= 0.225 6 cubic inch (in^3)
8 fluid drams	= 1 fluid ounce (fl oz or $\mathfrak{f}$ ℥)
	= 1.804 7 cubic inches
16 fluid ounces	= 1 pint (pt)
	= 28.875 cubic inches
	= 128 fluid drams
2 pints	= 1 quart (qt) = 57.75 cubic inches
	= 32 fluid ounces = 256 fluid drams
4 quarts	= 1 gallon (gal) = 231 cubic inches
	= 128 fluid ounces = 1024 fluid drams

[14] Squares and cubes of customary but not of metric units are sometimes expressed by the use of abbreviations rather than symbols. For example, sq ft means square foot, and cu ft means cubic foot.

[15] When necessary to distinguish the liquid pint or quart from the dry pint or quart, the word "liquid" or the abbreviation "liq" should be used in combination with the name or abbreviation of the liquid unit.

Units of Dry Volume[16]

2 pints (pt)	= 1 quart (qt) = 67.200 6 cubic inches (in^3)
8 quarts	= 1 peck (pk) = 537.605 cubic inches
	= 16 pints
4 pecks	= 1 bushel (bu) = 2150.42 cubic inches
	= 32 quarts

Avoirdupois Units of Mass[17]

[The "grain" is the same in avoirdupois, troy, and apothecaries units of mass.]

1 µlb	= 0.000 001 pound (lb)
$27^{11}/_{32}$ grains (gr)	= 1 dram (dr)
16 drams	= 1 ounce (oz)
	= 437½ grains
16 ounces	= 1 pound (lb)
	= 256 drams
	= 7000 grains
100 pounds	= 1 hundredweight (cwt)[18]
20 hundredweights	= 1 ton (t)
	= 2000 pounds[7]

In "gross" or "long" measure, the following values are recognized:

112 pounds (lb)	= 1 gross or long hundredweight (cwt)[7]
20 gross or long hundredweights	= 1 gross or long ton
	= 2240 pounds[7]

Troy Units of Mass

[The "grain" is the same in avoirdupois, troy, and apothecaries units of mass.]

24 grains (gr)	= 1 pennyweight (dwt)
20 pennyweights	= 1 ounce troy (oz t) = 480 grains
12 ounces troy	= 1 pound troy (lb t)
	= 240 pennyweights = 5760 grains

[16] When necessary to distinguish dry pint or quart from the liquid pint or quart, the word "dry" should be used in combination with the name or abbreviation of the dry unit.

[6] When necessary to distinguish the avoirdupois dram from the apothecaries dram, or to distinguish the avoirdupois dram or ounce from the fluid dram or ounce, or to distinguish the avoirdupois ounce or pound from the troy or apothecaries ounce or pound, the word "avoirdupois" or the abbreviation "avdp" should be used in combination with the name or abbreviation of the avoirdupois unit.

[7] When the terms "hundredweight" and "ton" are used unmodified, they are commonly understood to mean the 100-pound hundredweight and the 2000-pound ton, respectively; these units may be designated "net" or "short" when necessary to distinguish them from the corresponding units in gross or long measure.

Apothecaries Units of Mass

[The "grain" is the same in avoirdupois, troy, and apothecaries units of mass.]

20 grains (gr)	= 1 scruple (s ap or ℈)
3 scruples	= 1 dram apothecaries (dr ap or ʒ) = 60 grains
8 drams apothecaries	= 1 ounce apothecaries (oz ap or ℥) = 24 scruples = 480 grains
12 ounces apothecaries	= 1 pound apothecaries (lb ap) = 96 drams apothecaries = 288 scruples = 5760 grains

3. Notes on British Units of Measurement

In Great Britain, the yard, the avoirdupois pound, the troy pound, and the apothecaries pound are identical with the units of the same names used in the United States. The tables of British linear measure, troy mass, and apothecaries mass are the same as the corresponding United States tables, except for the British spelling "drachm" in the table of apothecaries mass. The table of British avoirdupois mass is the same as the United States table up to 1 pound; above that point the table reads:

14 pounds	= 1 stone
2 stones	= 1 quarter = 28 pounds
4 quarters	= 1 hundredweight = 112 pounds
20 hundredweight	= 1 ton = 2240 pounds

The present British gallon and bushel – known as the "Imperial gallon" and "Imperial bushel" – are, respectively, about 20 % and 3 % larger than the United States gallon and bushel. The Imperial gallon is defined as the volume of 10 avoirdupois pounds of water under specified conditions, and the Imperial bushel is defined as 8 Imperial gallons. Also, the subdivision of the Imperial gallon as presented in the table of British apothecaries fluid measure differs in two important respects from the corresponding United States subdivision, in that the Imperial gallon is divided into 160 fluid ounces (whereas the United States gallon is divided into 128 fluid ounces), and a "fluid scruple" is included. The full table of British measures of capacity (which are used alike for liquid and for dry commodities) is as follows:

4 gills	= 1 pint
2 pints	= 1 quart
4 quarts	= 1 gallon
2 gallons	= 1 peck
8 gallons (4 pecks)	= 1 bushel
8 bushels	= 1 quarter

The full table of British apothecaries measure is as follows:

20 minims	= 1 fluid scruple
3 fluid scruples	= 1 fluid drachm = 60 minims
8 fluid drachms	= 1 fluid ounce
20 fluid ounces	= 1 pint
8 pints	= 1 gallon (160 fluid ounces)

4. Tables of Units of Measurement

(all underlined figures are exact)

Units of Length - International Measure[19]

Units	Inches	Feet	Yards	Miles	Centimeters	Meters
1 inch =	1	0.083 333 33	0.027 777 78	0.000 015 78283	2.54	0.025 4
1 foot =	12	1	0.333 333 3	0.000 189 393 9	30.48	0.304 8
1 yard =	36	3	1	0.000 568 181 8	91.44	0.914 4
1 mile =	63 360	5 280	1 760	1	160 934.4	1609.344
1 centimeter =	0.393 700 8	0.032 808 40	0.010 936 13	0.000 006 213 712	1	0.01
1 meter =	39.370 08	3.280 840	1.093 613	0.000 621 371 2	100	1

Units of Length - Survey Measure[8]

Units	Links	Feet	Rods	Chains	Miles	Meters
1 link =	1	0.66	0.04	0.01	0.000 125	0.201 168 4
1 foot =	1.515 152	1	0.060 606 06	0.015 151 52	0.000 189 393 9	0.304 800 6
1 rod =	25	16.5	1	0.25	0.003 125	5.029 210
1 chain =	100	66	4	1	0.0125	20.116 84
1 mile =	8 000	5 280	320	80	1	1609.347
1 meter =	4.970 960	3.280 833	0.198 838 4	0.049 709 60	0.000 621 369 9	1

Units of Area - International Measure[20]

(all underlined figures are exact)

Units	Square Inches	Square Feet	Square Yards
1 square inch =	1	0.006 944 444	0.000 771 604 9
1 square foot =	144	1	0.111 111 1
1 square yard =	1296	9	1
1 square mile =	4 014 489 600	27 878 400	3 097 600
1 square centimeter =	0.155 000 3	0.001 076 391	0.000 119 599 0
1 square meter =	1550.003	10.763 91	1.195 990

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[8] One international foot = 0.999 998 survey foot (exactly)
One international mile = 0.999 998 survey mile (exactly)

[9] One square survey foot = 1.000 004 square international feet
One square survey mile = 1.000 004 square international miles

Note: 1 survey foot = $^{1200}/_{3937}$ meter (exactly)
1 international foot = 12 x 0.0254 meter (exactly)
1 international foot = 0.0254 x 39.37 survey foot (exactly)

tare-weighbeam elements. The combination of a tare bar and its fractional bar, or a tare bar alone if no fractional bar is associated with it.[2.20]

taximeter. A device that automatically calculates, at a predetermined rate or rates, and indicates the charge for hire of a vehicle.[5.54]

test chain. A device used for simulated tests consisting of a series of rollers or wheels linked together in such a manner as to assure uniformity of weight and freedom of motion to reduce wear, with consequent loss of weight, to a minimum.[2.21]

test liquid. The liquid used during the test of a device.[3.30, 3.31, 3.34, 3.35, 3.36, 3.37, 3.38]

test object. An object whose dimensions are verified by appropriate reference standards and intended to verify compliance of the device under test with certain metrological requirements.[5.58]

test puck. A metal, plastic, or other suitable object that remains stable for the duration of the test, used as a test load to simulate a package. Pucks can be made in a variety of dimensions and have different weights to represent a wide range of package sizes. Metal versions may be covered with rubber cushions to eliminate the possibility of damage to weighing and handling equipment. The puck mass is adjusted to an accuracy specified in N.1.2. Accuracy of Test Pucks or Packages.[2.24]
(Amended 2004)

test train. A train consisting of or including reference weight cars and used to test coupled-in-motion railway track scales. The reference weight cars may be placed consecutively or distributed in different places within a train.[2.20]
(Added 1990) (Amended 1991)

test weight car. A railroad car designed to be a stable mass standard to test railway track scales. The test weight car may be one of the following types: a self-contained composite car, a self-propelled car, or a standard rail car.[2.20]
(Added 1991)

testing. An operation consisting of a series of volumetric determinations made to verify the accuracy of the volume chart that was developed by gauging.[4.42]

time recorder. A clock-operated mechanism designed to record the time of day. Examples of time recorders are those used in parking garages to record the "in" and "out" time of day for parked vehicles.[5.55]

timing device. A device used to measure the time during which a particular paid-for service is dispensed. Examples of timing devices are laundry driers, car-wash timers, parking meters, and parking-garage clocks and recorders.[5.55]

tolerance. A value fixing the limit of allowable error or departure from true performance or value. (See also "basic tolerances.")[1.10]

training idlers. Idlers of special design or mounting intended to shift the belt sideways on the conveyor to assure the belt is centered on the conveying idlers.[2.21]

transfer standard. A measurement system designed for use in proving and testing cryogenic liquid-measuring devices.[3.38]

tripper. A device for unloading a belt conveyor at a point between the loading point and the head pulley.[2.21]

U

uncoupled-in-motion railroad weighing system. A device and related installation characteristics consisting of (1) the associated approach trackage, (2) the scale (i.e., the weighing element, the load-receiving element, and the indicating element with its software), and (3) the exit trackage, which permit the weighing of railroad cars uncoupled in motion.[2.20]
(Added 1993)

underregistration. See "overregistration" and "underregistration."[1.10]

unit price. The price at which the product is being sold and expressed in whole units of measurement.[1.10, 3.30]
(Added 1992)

unit train. A unit train is defined as a number of contiguous cars carrying a single commodity from one consignor to one consignee. The number of cars is determined by agreement among the consignor, consignee, and the operating railroad.[2.20]

unit weight. One contained within the housing of an automatic-indicating scale and mechanically applied to and removed from the mechanism. The application of a unit weight will increase the range of automatic indication, normally in increments equal to the reading-face capacity.[2.20]

user requirement. A requirement dealing with the selection, installation, use, or maintenance of a weighing or measuring device. User requirements are directed primarily to the users of devices (see also Introduction, Section Q).[1.10]

usual and customary. Commonly or ordinarily found in practice or in the normal course of events and in accordance with established practices.[1.10]

utility-type water meter. – A device used for the measurement of water, generally applicable to meters installed in residences or business establishments, excluding batching meters. [3.36]
(Added 2011)

V

value of minimum graduated interval. The value represented by the interval from the center of one graduation to the center of the succeeding graduation. Also, the increment between successive recorded values. (Also see "graduated interval.")[1.10]

vapor equalization credit. The quantity deducted from the metered quantity of liquid carbon dioxide when a vapor equalizing line is used to facilitate the transfer of liquid during a metered delivery.[3.38]

vapor equalization line. A hose or pipe connected from the vapor space of the seller's tank to the vapor space of the buyer's tank that is used to equalize the pressure during a delivery.[3.38]

vehicle on-board weighing system. A weighing system designed as an integral part of or attached to the frame, chassis, lifting mechanism, or bed of a vehicle, trailer, industrial truck, industrial tractor, or forklift truck.[2.20]
(Amended 1993)

vehicle scale. A scale adapted to weighing highway, farm, or other large industrial vehicles (except railroad freight cars), loaded or unloaded.[2.20]

verification scale division, value of (e). A value, expressed in units of weight (mass) and specified by the manufacturer of a device, by which the tolerance values and the accuracy class applicable to the device are determined. The verification scale division is applied to all scales, in particular to ungraduated devices since they have no graduations. The verification scale division (e) may be different from the displayed scale division (d) for certain other devices used for weight classifying or weighing in pre-determined amounts, and certain other Class I and II scales.[2.20]

visible type. A type of device in which the measurement takes place in a see-through glass measuring chamber.[3.30]

v_{min} (minimum load cell verification interval). The smallest load cell verification interval, *expressed in units of mass** into which the load cell measuring range can be divided.[2.20, 2.24]
*[*Nonretroactive as of January 1, 2001]*
(Added 1996) (Amended 1999)

W

weighbeam. An element comprising one or more bars, equipped with movable poises or means for applying counterpoise weights or both.[2.20]

Chapter 6. Automotive Products Specifications

Article 1. Brake Fluid Standards

4100. Specifications. - Brake fluid shall conform to the current specifications of the National Highway Traffic Safety Administration, United States Department of Transportation.

NOTE: Authority cited: Sections 12027 and 13710(c), Business and Professions Code. Reference: Section 13710(c), Business and Professions Code.

Article 2. Brake Fluid Labeling

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4110 – 4111. - Repealed 11-19-85.

4112. Container Labeling. - In addition to the requirements of Section 13711(d), Business and Professions Code, the label of each container of brake fluid shall bear the brand name in letters not less than one-eighth inch (3.18 mm) in height.

Numerals used in connection with the brand name or merits of the product shall not exceed the actual dry equilibrium reflux boiling point of the product. Nothing in this section prohibits the use of any numeral or combination thereof in such a manner that it cannot reasonably be confused with the dry equilibrium reflux boiling point of the product.

NOTE: Authority cited: Sections 12027, 12609 and 13710(c), Business and Professions Code. Reference: Sections 12602 and 13711(d), Business and Professions Code.

Article 3. Automatic Transmission Fluid Standards

4120 - 4126. - Repealed 8-18-87.

Article 4. Automatic Transmission Fluid Registration

4130. - Repealed 11-19-85.

Article 5. Engine Fuel Standards

4140. Definitions Used in Title 4, Division 9, Chapters 6 and 7.

(a) "Biodiesel" means a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B100, and meeting the specifications set forth by the ASTM International in the latest version of Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels D6751 contained in the ASTM publication entitled: Annual Book of ASTM Standards, Section 5.

(b) "Diesel fuel" means a light middle or middle distillate fuel which may be blended up to 5. volume percent biodiesel, and meeting the specifications set forth by the ASTM International in the latest version of Standard Specification for Diesel Fuel Oils D975 contained in the ASTM publication entitled: Annual Book of ASTM Standards, Section 5.

(c) "Biodiesel blend" means biodiesel blended with petroleum-based diesel fuel.

(d) "Non-ester renewable diesel" means a diesel fuel registered as a motor vehicle fuel or fuel additive under 40 CFR Part 79, as amended by Pub. L. 91-604, produced from nonpetroleum renewable resources that is not a mono-alkyl ester.

(e) "Non-ester renewable diesel blend" means non-ester renewable diesel blended with petroleum-based diesel fuel.

(f) "Biomass-based diesel" means a renewable diesel fuel that meets the definition of either biodiesel or non-ester renewable diesel.

NOTE: Authority cited: Sections 12027, 13440 and 13450, Business and Professions Code. Reference: Sections 13401, 13440, 13441, 13450 and 13451, Business and Professions Code.

4141. Specifications-Automotive Spark Ignition Engine Fuel. Automotive spark ignition engine fuel specifications shall conform to the latest standards set forth in the ASTM International D 4814 with the following exception:

Vapor pressure specifications shall not be more than the maximum specified by any California state law. When the maximum Reid Vapor Pressure specification for automotive spark-ignition engine fuel is below that established by D 4814, the Vapor Pressure/Distillation Class AA specification for distillation temperatures may be applied in the manufacture of automotive spark-ignition engine fuel.

NOTE: Authority cited: Sections 12027 and 13440, Business and Professions Code. Reference: Sections 13401(m), 13440 and 13441, Business and Professions Code.

4142. Specifications-Kerosene. - Kerosene shall meet the specifications set forth by the ASTM International in the latest version of Standard Specification for Kerosene D 3699 contained in ASTM publication entitled: Annual Book of ASTM Standards, Section 5.

NOTE: Authority cited: Sections 12027, 12609 and 13450, Business and Professions Code. Reference: Sections 13401(c) and 13450, Business and Professions Code.

4143. Specifications-Fuel Oil. - Fuel oil shall meet the specifications set forth by the ASTM International in the latest version of Standard Specification for Fuel Oils D 396 contained in the ASTM publication entitled: Annual Book of ASTM Standards, Section 5, except the sulfur content shall not exceed the maximum specified by any California state law.

NOTE: Authority cited: Sections 12027 and 13450, Business and Professions Code. Reference: Sections 13401(l) and 13450, Business and Professions Code.

4144. Specifications-Diesel Fuel. - Diesel fuel shall meet the specifications set forth by the ASTM International in the latest version of Standard Specification for Diesel Fuel Oils D 975 contained in the ASTM publication entitled: Annual Book of ASTM Standards, Section 5, except the sulfur content shall not exceed the maximum specified by any California state law.

NOTE: Authority cited: Sections 12027 and 13450, Business and Professions Code. Reference: Sections 13401(j) and 13450, Business and Professions Code.

4145. Specifications – Developmental Fuels.

(a) Sales of developmental engine fuels authorized by the Department are not subject to restrictions imposed upon the sale of non-conforming fuel products as set forth in Business and Professions Code Sections 13441, 13442 and 13451, but the Department's authorization does not create a variance or waiver from any other applicable California statute or regulation.

(b) An applicant for authorization to sell developmental engine fuel must submit the following information to the Department:
(1) a statement of the potential benefit of the fuel to the people of California; and
(2) a description of test conditions associated with the use of the fuel, including control and monitoring practices, and the method of distribution and storage.

(c) Any authorization provided by the Department is subject to the following terms and conditions:
(1) The authorization is limited to a period of two years, with an automatic renewal for an additional two years in the absence of action to revoke the authorization by the Department; and,
(2) Damages caused by sale, delivery, storage, handling and usage of the fuel shall be addressed in accordance with contractual provisions negotiated and agreed upon by the authorization holder and the user; and,
(3) The authorization holder shall report information to the Department as required to monitor the use of the fuel during the process of developing a generally recognized chemical and performance standard through a recognized consensus organization or standards writing organization, such as ASTM International or SAE International. The Department shall specify the reporting requirements on a case by case basis at the time the authorization is granted.
(4) Any device used for the sale or distribution of a developmental engine fuel must comply with the Business and Professions Code Section § 12500 (e).

(d) The Department may take action to revoke the authorization at any time. Revocation of the authorization is effective and final upon receipt of written notification by the authorization holder. The Department may take action to revoke the authorization if the Department finds:
(1) the authorization holder has violated any of the terms and conditions of the authorization; or,
(2) the authorization holder has abandoned efforts to develop a generally recognized chemical and performance standard for the fuel through a recognized consensus organization or standards writing organization.
(3) there is a high probability of equipment harm with the continued use of the developmental fuel or to protect the public safety.
(e) The authorization shall cease to exist upon publication of a generally recognized chemical and performance standard for the fuel.

NOTE: Authority cited: Sections 12027 and 13405, Business and Professions Code. Reference: Sections 13401, 13440 - 13443 and 13450 - 13451, Business and Professions Code.

4146. Specifications – E85 Fuel Ethanol. – E85 Fuel Ethanol shall meet the specifications set forth by ASTM International in the latest version of "Standard Specification for Fuel Ethanol (Ed75 – Ed85) for Automotive Spark-Ignition Engines D 5798", contained in the ASTM publication entitled: Annual Book of ASTM Standards, Section 5.
NOTE: Authority cited: Sections 12027 and 13440, Business and Professions Code. Reference: Sections 13401(m), 13440 and 13441, Business and Professions Code.

4147. Specifications – M85 Fuel Methanol. – M85 Fuel Methanol shall meet the specifications set forth by ASTM International in the latest version of "Standard Specification for Fuel Methanol (M70 – M85) for Automotive Spark-Ignition Engines D 5797", contained in the ASTM publication entitled: Annual Book of ASTM Standards, Section 5.

NOTE: Authority cited: Sections 12027 and 13440, Business and Professions Code. Reference: Sections 13401(m), 13440 and 13441, Business and Professions Code.

4148. Specifications – Biodiesel Blends. – Biodiesel Fuel Blends shall meet the following specifications:

(a) Biodiesel blends with a concentration of 5. volume percent biodiesel or less shall meet the specification set forth by ASTM International in the latest version of the "Standard Specification for Diesel Fuel Oils" D975, publication entitled: Annual Book of ASTM Standards, Section 5.

(b) Biodiesel blends with a concentration from 6. to 20. volume percent biodiesel shall meet the specifications set forth by ASTM International in the latest version of the "Standard Specification for Diesel Fuel Oil, Biodiesel Blend (B6 to B20)" D7467, contained in the ASTM publication entitled: Annual Book of ASTM Standards, Section 5.

(c) Any finished biodiesel fuel blend greater than 20. volume percent biodiesel, shall meet the specifications set forth by ASTM International in the latest version of the specifications set forth for biodiesel blends greater than 20. volume percent biodiesel.

(1) Absent an ASTM International specification, the CDFA shall establish specifications pursuant to Business and Professions Code, Division 5, Chapter 14, Section 13450 using the data determined upon completion of the California Energy Commission Interagency Agreement, wherein the CDFA will perform test methods and standards development for biodiesel blends greater than 20 volume percent.
(2) These interim standards will remain in place until such time as a recognized consensus organization or standards writing organization, such as ASTM International or SAE International, adopts specifications for biodiesel blends greater than 20. volume percent.
(3) Biodiesel blends greater than 20. volume percent may only be sold under a developmental engine fuel variance obtained pursuant to Section 4145 of this article. Any variance granted will expire at such time as the CDFA adopts specifications for biodiesel blends greater than 20. volume percent biodiesel.

NOTE: Authority cited: Sections 12027 and 13450, Business and Professions Code. Reference: Sections 13401(j) and 13450, Business and Professions Code.

4149. Specifications – Non-ester Renewable Diesel Blends. – Non-ester Renewable Diesel Blends shall meet the specifications set forth by the ASTM International in the latest version of Standard Specification for Diesel Fuel Oils D975 contained in the ASTM publication entitled: Annual Book of ASTM Standards, Section 5.

NOTE: Authority cited: Sections 12027 and 13450, Business and Professions Code. Reference: Sections 13401(j) and 13450, Business and Professions Code

Chapter 7. Advertising of Gasoline and Other Motor Vehicle Fuels

4200. Advertising Medium. - "Advertising medium," as used in this subchapter, includes banner, sign, placard, poster, streamer and card, whether or not mounted, whether appearing on the same or different standards, or whether or not physically connected with each other, provided, the advertised statements can reasonably be read as one advertising message.

NOTE: Authority cited: Sections 12027 and 12609, Business and Professions Code. Reference: Sections 13531, 13532, 13534, 13535, 13536, 13537, 13538, 13539, and 13540 Business and Professions Code.

4201. Price Sign Display on Dispensing Apparatus. - In addition to the requirements of Sections 13470 and 13480, Business and Professions Code, any sign referring to the price of gasoline or other motor vehicle fuel displayed on any dispensing apparatus from which gasoline or other motor vehicle fuel is being offered for sale or sold, shall be limited to the following:

(a) actual price per gallon or liter, and

(b) conversion chart information required for liter sales per Section 13470.5, Business and Professions Code

(c) brand name and the name of the product may be displayed.

NOTE: Authority cited: Sections 12027 and 12609, Business and Professions Code. Reference: Sections 13470, 13470.5 and 13480, Business and Professions Code.

4202. Labeling and Price Sign Advertising Requirements for Biodiesel and Biodiesel Blends.

(a) The labeling on biodiesel and biodiesel blend dispensers shall meet the requirements found in the latest version of the Federal Trade Commission (FTC) 16 CFR Part 306 "Automotive Fuel Ratings, Certification and Posting" Rule, as published in the Federal Register Volume 75, Number 50, dated March 16, 2010.

(b) The name of the product and grade designation shall be on all dispensers, advertising signs, and storage tank labels as required in Section 13480 and 13532 of the Business and Professions Code.

(c) Every biodiesel dispenser dispensing blends greater than 5. volume percent shall display on each customer side, as required by Section 13484 of the Business and Professions Code, a sign clearly visible which reads as follows:

"THIS FUEL CONTAINS BIODIESEL. CHECK THE OWNER'S MANUAL OR WITH YOUR ENGINE MANUFACTURER BEFORE USING."

NOTE: Authority cited: Sections 12027 and 13450, Business and Professions Code. Reference: Sections 13480 and 13484, Business and Professions Code.

4203. Labeling and Price Sign Advertising Requirements for Biomass-Based Diesel and Biomass-Based Diesel Blends.

(a) The labeling on biomass-based diesel and biomass-based diesel blend dispensers shall meet the requirements found in the latest version of the Federal Trade Commission (FTC) 16 CFR Part 306 "Automotive Fuel Ratings, Certification and Posting" Rule, as published in the Federal Register Volume 75, Number 50, dated March 16, 2010.

(b) The name of the product and grade designation shall be on all dispensers, advertising signs, and storage tank labels as required in Section 13480 and 13532 of the Business and Professions Code.

NOTE: Authority cited: Sections 12027 and 13450, Business and Professions Code. Reference: Sections 13480 and 13484, Business and Professions Code.

4204. Labeling and Price Sign Advertising Requirements for E85 Fuel Ethanol and M85 Fuel Methanol

(a) The labeling on E85 Fuel Ethanol and M85 Fuel Methanol dispensers shall meet the requirements found in the latest version of the FTC 16 CFR Part 306 "Automotive Fuel Ratings, Certification and Posting" Rule, as published in the Federal Register Volume 75, Number 50, dated March 16, 2010.

(b) All dispensers, advertising signs and storage tank labels shall comply with the requirements of Section 13480 and 13532 of the Business and Professions Code. E85 Fuel Ethanol and M85 Fuel Methanol shall use, at a minimum, the words "E85" "Ethanol", or "M85" "Methanol" in close proximity to describe the name of the product.

(c) E85 Fuel Ethanol and M85 Fuel Methanol are defined as alternative fuels by the Federal Trade Commission (FTC) and therefore no grade designation is required.

NOTE: Authority cited: Sections 12027, 13480 and 13484, Business and Professions Code. Reference: Sections 13401(m), 13440 and 13441, Business and Professions Code.

4205. **Illumination.** - In addition to the requirements of Section 13536, Business and Professions Code, when any advertising message is illuminated, the entire message shall be uniformly illuminated.

NOTE: Authority cited: Section~~s~~ 12027 ~~and 12609~~, Business and Professions Code. Reference: Section 13536, Business and Professions Code.

Article 2. Weights and Measures Penalty Guidelines

4800. Notice of Proposed Action and Disposition.

(a) When a county sealer takes administrative action, the person charged with a violation(s) shall be notified of the proposed penalty(s) and the right to request a hearing. The notification shall also include the right to appeal to the Secretary pursuant to the procedures provided in Section 12015.3(c) or Section 13302 as appropriate of the Business and Professions Code.

(b) When the State Sealer takes administrative action, the person charged with the violation(s) shall be notified of the proposed penalty(s), and the right to request a hearing. The notification shall also include the right to have the decision reviewed, within 30 days of receiving the sealer's decision, pursuant to Section 12015.3(c) of the Business and Professions Code.

(c) When a respondent in an administrative action agrees to stipulate to the notice of proposed action, a signed stipulation with the payment of the proposed administrative penalty shall be returned to the county/State Sealer within 45 days of the postmark of the notice of proposed action. If the stipulation and payment of the proposed administrative penalty are not received within 45 days, the county/State Sealer may file a certified copy of a final decision that directs the payment of a civil penalty with the clerk of the superior court of any county pursuant to Section 12015.3(d) of Business and Professions Code.

(d) If an administrative hearing is requested, a proposed decision and order shall be made by a hearing officer within 60 days of the conclusion of the hearing. The final decision and order shall be made by the sealer. This order will be mailed to the respondent. Any penalty imposed shall be due and payable within 45 days of the postmark of such order. If a respondent fails to pay the penalty and fails to timely file a written appeal pursuant to Business and Professions Code Section 12015.3(c) or 13302(c), the sealer may take action as provided in Business and Professions Code Sections 12015.3(d) or 13302(d). Action may be taken to collect the penalty and the collection costs actually incurred.

(e) In the event that a respondent fails to comply with the provisions of Business and Professions Code Sections 12015.3 or 13302, the sealer may take the action proposed without a hearing. This action may include collection of the penalty and the collection costs actually incurred.

NOTE: Authority cited: Sections 12015.3(b) and 13302(b), Business and Professions Code. Reference: Sections 12015.3(b) and 13302(b), Business and Professions Code.

4801. Administration**.**

(a) When a county sealer initiates an action, the sealer shall send a copy of the notice of proposed action to the State Sealer at the time of notice to the person charged with the violation(s). Additionally, the county sealer shall inform the State Sealer of violations for which penalties have been assessed. On at least an annual basis, the State Sealer shall inform county sealers throughout the State of violations for which penalties have been assessed.

(b) When the State initiates the action, the State Sealer shall send a copy of the notice of proposed action to the county sealer involved. This notice shall also be sent, at the time of notice, to the person charged with the violation(s). The State Sealer shall also inform the county sealer in which the action has been initiated of violations for which penalties have been assessed.

NOTE: Authority cited: Section 12027, Business and Professions Code. Reference: Sections 12027, Business and Professions Code.

4802. Penalty Guidelines. In applying Sections 12015.3 or 13302 of the Business and Professions Code, the sealer shall use the provisions of this section to determine the types of violations for which penalties may be assessed and the amounts of the penalties. Nothing in this article prohibits a sealer from seeking other relief through the criminal or civil court process in lieu of administrative action.

(a) For the purposes of this article, violation types are designated as "Category A", "Category B", and "Category C".

(1) "Category A" violations are violations in which there are actual, or there is the potential for actual false, deceptive, or misleading business practices, or significant monetary loss to consumers; or repeated violations of subparagraph (2) that occurred within a two-year period at the same location and which resulted in an action and subsequent penalty. Included in this category are certain violations subject to prior legislated fine levels pursuant to Business and Professions Code Section 12729. The appropriate penalty range for these violations is $400-$1,000; however, such penalty shall not exceed the maximum criminal fine specified in the charging section.

(2) "Category B" violations are violations in which there is a reasonable potential for intermediate level of consumer or competitive harm; or repeated violations of subparagraph (3) that occurred within a two-year period at the same location and which resulted in an action and subsequent penalty. The appropriate penalty range for these violations is $150-$600; however, such penalty shall not exceed the maximum criminal fine specified in the charging section.

(3) "Category C" violations are primarily violations that would typically have a less egregious effect on consumers or equitable competition in the marketplace. Included in this category are other violations included in Business and Professions Code, Division 5 that are not included in Table A. The appropriate penalty range for these violations is $50-$250; however, such penalty shall not exceed the maximum criminal fine specified in the charging section.

(b) Table A shall be used to establish the level of severity of a particular violation and its corresponding penalty range. Except where specific violation parameters are provided, the violation column in Table A is an abbreviated description of the corresponding section in the California Business and Professions Code, Division 5, Weights and Measures.

1 = Category A ($400 to $1,000) | **2** = Category B ($150 to $600) | **3** = Category C ($50 to $250)

TABLE A

B&P §	VIOLATION	TYPE		
12016	Hindering or obstructing sealer.	**1**		
12018	Neglect or Refusal to exhibit weighing or measuring device for inspection	**1**		
12021	Marking or stamping false or short weight or measure on containers: Taking false tare (knowingly).	**1**		
12022.5	Fresh meats or roasts: Advertising/selling on basis of net weight, not including added fat.		**2**	
12023	Selling according to gross weight or measure.		**2**	
12024 *(Prepacked product – Labeled and sold, but not packed on the same premises)*	Selling in less quantity than represented: Prepackaged – Labeled and sold, but not packed on the same premises.			
	- Single Lot:			
	Overcharge less than 50¢.			**3**
	Overcharge 50¢ to $2.00.		**2**	
	Overcharge more than $2.00.	**1**		
	- Total of All Lots:			
	Overcharge less than $2.00.			**3**
	Overcharge $2.00 to $10.00.		**2**	
	Overcharge more than $10.00.	**1**		
	Short measure bulk wood deliveries.	**1**		

B&P §	VIOLATION	TYPE		
12024 (Prepacked product – Packed, labeled, and sold on the same premises)	Selling in less quantity that represented (per BPC §12024.3 criteria) Prepackaged – Packed, labeled, and sold on the same premises			
	- Single Lot (unknowingly):			
	Overcharge of $2.00 or less			3
	Overcharge more than $2.00	1		
	- Total of Multiple Lots (unknowingly):			
	Overcharge of less than $2.00			3
	Overcharge $2.00 to $10.00		2	
	Overcharge more than $10.00	1		
12024 (Wholesale or retail lots – not packed or labeled by retailer)	Selling in less quantity than represented: Prepacked – Wholesale or retail lots – Not packed or labeled by retailer			
	Overcharge not more than $50.00		2	
	Overcharge more than $50.00	1		
12024.1	Misrepresenting charge for service rendered (willfully).	1		
12024.2	Unlawful computation of value.			
	(A) Test Purchase of Commodities by Weight, Measure, or Count, Determined at Time of Sale: (Applies to any number of items purchased or inspected for pricing integrity)			
	- Overcharged on One Item: Overcharge equals 15¢ or more and is 5% or more of correct value for that item.		**2**	
	- Overcharged on Two or More Items: Total Overcharge equals 15¢ or more and is 3% or more of correct total value for those items.	**1**		
	(B) Scanning/Automated and Other Check stand Inspections.			
	- Overcharged on fewer than 10% of items purchased or inspected for pricing integrity or total overcharge is less than 2% of correct total price of all items purchased or inspected.			**3**
	- Overcharged on 10% or more but on fewer than 12% of items purchased or inspected for pricing integrity.		**2**	
	- Total overcharge 2% or more but less than 4% of correct total price of all items purchased or inspected.		**2**	

B&P §	VIOLATION	TYPE		
	- Overcharged on 12% or more of items purchased or inspected for pricing integrity.	**1**		
	- Total overcharge 4% or more of the correct total price of all items purchased or inspected.	**1**		
12024.2 Cont.	Test Sample Size of 10 or Fewer Items ("Initial Standard Inspections" as defined by BPC §13350 or "Special Inspections" as defined by BPC §13356):			
	- Overcharge on any item does not exceed 8% of the correct price of that item			3
	- Overcharge on any item is greater than 8% but does not exceed 15% of the correct price of that item		2	
	- Overcharge on any item is greater than 15% of the correct price of that item	1		
12024.5	Sale of fowl, meat, or fish other than by weight: ready-to-eat items.		**2**	
12024.55	Door-to-door salespersons; failure to provide price per pound statements on packages.		**2**	
12024.6	Prohibition of advertising intended to entice customer into transaction other than represented.	**1**		
12024.7	Failure to provide: A statement of weight and type of cuts of meat sold; itemized statement showing quantity of fruits, vegetables, and other food products delivered in connection with meat sale.		**2**	
12024.9	Failure to provide a statement of weights supplied to consumer upon direct sale of meat on basis of primal cuts or carcass weight.		**2**	
12024.10	Failure to retain a document stating weight and cut of meat sold.		**2**	
12025	Refusal to exhibit commodity being sold at given weight or quantity.	**1**		
12025.5	Identification of commodity or container ordered "off sale" under §§ 12211 or 12607.	**1**		
12107	Violation of tolerances and specifications for commercial weighing and measuring apparatus.			**3**
12107.1	Establishment of commodity standards, weights, measures, and counts: Procedure: Unlawful sales.			**3**
12500.5	Approval and certification of commercial instruments: Sale or use for commercial purposes of nonapproved instruments.		**2**	
12507	Repair of "out of order" instruments: Time: Disuse: Effect of refusal or neglect to repair: Disposition of seized instruments.	**1**		
12508	Removal or obliteration of sealer's tag or device.	**1**		
12510(a)	Presumption of intent to violate law:			
	(1) Using an incorrect device.		**2**	
	(2) Sells commercial device not sealed within last year.			**3**

B&P §	VIOLATION	TYPE		
Cont. 12510(a)	(3) Using a condemned device contrary to law.	**1**		
	(4) Uses for commercial purposes an unsealed, incorrect device not kept at fixed location.		**2**	
	(5) Used to falsify.	**1**		
	(6) Location of retail scale.		**2**	
	(7) False computation of price.		**2**	
	(8) Return to zero (knowingly).	**1**		
	(9) Deliver for test.		**2**	
	(10) Sells, uses, rents, loans incorrect device.		**2**	
12512	Purchase of less than true quantity.	**1**		
12515	(a) Repair, sale, or installation of instrument: Failure to notify county sealer.		**2**	
12516	Location of scale when auctioning livestock		**2**	
12532	(a) Engaging in business as a service agency when not registered with the Secretary of Food and Agriculture		**2**	
12533	(a) (1) Not possessing or having available necessary standards and testing equipment			**3**
	(2) Standards and testing equipment shall meet specifications and tolerances in NIST 105 Series Handbooks			**3**
	(b) Ensure every service agent has a current service agent license		**2**	
	(c) Possess a current copy of Title 4 of the California Code of Regulations, Field Reference Manual			**3**
12534	Use suitable and sufficient standards, permanently and uniquely identified and have a current certificate of accuracy			**3**
12540	Service agent examination and licensing		**2**	
12602	Distributing commodity contained in nonconforming package: Exception for wholesale or retail distributors not engaged in packaging or labeling.		**2**	
12603	Regulations to be established by Secretary: Required provisions of regulations.			
	- Identity of commodity and/or name and place of business of packer/distributor/manufacturer.		**2**	
	- Net quantity of contents not on container or label.		**2**	
12605	Prohibition of distribution of packaged commodity containing qualifying words in separate statement of net quantity of contents: Supplemental statements: Prohibited qualifications.		**2**	
12606	Containers not to be constructed or filled as to facilitate fraud		**2**	
12606.*2*	Misleading food containers, prohibited		**2**	

B&P §	VIOLATION	TYPE		
12611	Selling commodity in nonconforming container or with nonconforming label: Required information not prominently displayed.		**2**	
12703	Weighmaster License, fee and/or penalty required.		**2**	
12704	Weighmaster License fee.		**2**	
12705	Change in legal entity of weighmaster licensee.		**2**	
12707	Weighmaster License renewal; failure to pay fee when due.		**2**	
12710.5	(b) Failure to notify of replacement/deletion of deputy weighmaster.			**3**
12711	When weighmaster certificate to be issued.		**2**	
12712	Issuance of certificate by one other than weighmaster making determination; transfer of weight or measure to other certificate.			
	(a) Weighmaster certificates issued based on information from another weighmaster.		**2**	
	(b) Transfer of weight from one certificate to another.		**2**	
12713	(a) Responsibility for completeness of weighmaster certificate.		**2**	
	(b) Omitted information on weighmaster certificate.		**2**	
12714	Weighmaster certificate legend/principal licensee name.			**3**
12714.5	Information on certificate to be legible; consecutive numbering.			**3**
12715	Contents of weighmaster certificate.			**3**
12716	Weighmaster recordkeeping; inspection.		**2**	
12716.5	Correction of errors (weighmaster certificate).		**2**	
12717	Approval, testing, and sealing of weighing or measuring device.		**2**	
12718	(a) Requests a person to weigh, measure, or count falsely.	**1**		
	(b) Requests a false or incorrect weighmaster certificate.	**1**		
	(c) Furnishes or gives false information to a weighmaster.	**1**		
	(d) Knowingly presents for payment a false weighmaster certificate.	**1**		
12718	(e) Knowingly issues a false weighmaster certificate.	**1**		
	(f) Alters a weighmaster certificate resulting in a false weight, measure, or count.	**1**		
	(g) Possesses blank weighmaster certificates if not licensed.	**1**		
	(h) Issues a weighmaster certificate with alterations or omissions of gross, net, tare weights, net only weights, or measurements.	**1**		
12719	Change of net contents after recordation of weight.	**1**		
12720	Alteration of tare weight of vehicle prior to determining net weight of commodity.	**1**		
12721	Weighing for purposes of certification.	**1**		

B&P §	VIOLATION	TYPE		
12722	Use of predetermined tare weight; exemption for specified rock products.			
	(a) Violation of tare regulations.	**1**		
	(b) Rock, sand, and gravel predetermined tares.	**1**		
12724	Determination of gross and tare weights by a weighmaster; requirement that all persons be off scale and vehicle; exceptions.		**2**	
12725	Conditions under which gross weight not to be certified.		**2**	
12727	Verification of weight, measure, or count.	**1**		
12728	Requirement that entire vehicle rest on scale; exemption for seed cotton, multiple rail cars containing grain/grain products.		**2**	
12729 (c)	Tomato cab card tare weight. (See also B&P Section 12729)	**1**	**2**	
12730	Farm products.		**2**	
12731	Livestock.		**2**	
12732	Adjustments to load; commodity weights determined at other than site where vehicle was loaded.		**2**	
12733	Scrap metal and salvage materials.		**2**	
12734	Squid or anchovy.		**2**	
13300	Customer display and indicator requirements		2	
13411	Sale of petroleum products contingent upon additional purchase.		**2**	
13413	Deceptive, false, or misleading statements (Chapter 14) Petroleum Products.	**1**		
13420 ***13421*** ***13422***	Operators of petroleum dealerships required to make monthly update of advertising medium indicating hours of sale and turn off lights when not open for business.			**3**
13441	Sale or delivery of nonstandard product.	**1**		
13442	Sale or delivery of nonstandard product as motor fuel to be labeled "not gasoline".	**1**		
13451	Sale or delivery of nonstandard diesel, kerosene, or fuel oil.	**1**		
13460 ***13461***	Sale of engine or gear oil which fails to meet specifications.	**1**		
13470	Display of price sign on dispensing apparatus: Contents of sign.		**2**	
13470.5	Gallon-to-liter conversion table.		**2**	
13472	Dual pricing.		**2**	
13480	Sale, etc., of petroleum products from unlabeled containers, etc: Viscosity rating: Containers with net content of gallon or less.			**3**
13482	Sale of lubricant without SAE/API service classification.			**3**
13486	Filling of tanks with product other than that identified on container label.	**1**		

B&P §	VIOLATION	TYPE		
13500	Labeling:			
	(a) No product and/or grade on delivery vehicle.			**3**
13501	Commingling of products.	**1**		
13502, 13486	Deliveries into storage tanks.	**1**		
13520	Temperature-corrected gallonage.		**2**	
13530	Application of article; display of price per liter or per gallon.			
	(a) Advertising a price that is not identical with the dispenser.		**2**	
13531	Display requirements; exemption of specified geographic areas; violations.			
	(a) Failure to advertise motor fuel prices.		**2**	
13532	Motor fuel; contents of display:			
	(a) Advertising price signs.			**3**
	(b) Violation of discount advertising.			**3**
	(c) Advertising lower price only. (See also § 13413)		**2**	
	(d) Failure to advertise price in same form.		**2**	
13534	Additional advertising matter.			**3**
13562	Change of designation under which product purchased: Authorization.		**2**	
13568	Written authority; furnishing copies.		**2**	
13570	Percentage of alcohol to be stated on normal business records: Certification of antiknock index.		**2**	
13571	Not providing documentation when requested.		**2**	
13593	Refusal to permit sampling.	**1**		
13595	Selling product which does not meet specifications. (See also §§ 13413, 13441, 13451)	**1**		
	Selling from unlabeled or mislabeled containers. (See also §§ 13413, 13480)			**3**
13600	Unauthorized breaking, etc., of seal.	**1**		
13740	Sale or distribution of adulterated or mislabeled product.	**1**		
13741	Deceptive, false, misleading statement (Chapter 15) Automotive Products	**1**		

NOTE: Authority cited: Sections 12015.3(a), 13302(a), and 12027, Business and Professions Code. Reference: Sections 12015.3(a), 13302(a), and 12027, Business and Professions Code.