NIST Handbook 44 Taximeter Code

Initial Meeting August 17-18, 2011

CADMS - Sacramento, CA.

Meeting Summary

A. Scope of the initial work group

Due primarily to advancements in taximeter technology over the past decade and recent practices for hire of a taxi the National Institute of Standards and Technology (NIST) began a project in collaboration with the National Conference on Weights and Measures (NCWM) to update legal metrology requirements to recognize these latest innovations in the taxi industry. The project was also established in response to requests from weights and measures jurisdictions for more specific guidelines, requirements, and test procedures to fully address these newer applications.

A small group of people having experience with NIST Handbook 44 Taximeters code, and type evaluation procedures used by the National Conference on Weights and Measures National Type Evaluation Program (NTEP) was formed in June 2011 to achieve these goals. The group met in August 2011 and consisted of:

John Barton – NIST (Technical Advisor)
Juana Williams – NIST
Bill Fishman – NY Weights & Measures, National Type Evaluation Program (Retired)
Van Thompson – CA. Div. Measurement Standards (CADMS)
Charlie Nelson – CA. Feed, Fertilizer and Livestock Drugs Regulatory Services (formerly of CADMS)

The following summary contains questions regarding changes to taximeters and the industry, discussion points considered by the group, and any conclusions settled upon at the August 2011 meeting.

Amendments to the existing NIST HB 44 Taximeters code and corresponding definitions of terms in HB 44 Appendix D – Definitions proposed by the group are shown in Addendum I and Addendum II respectively.

B. NIST HB44 Taximeter Code scope:

I. Application of the Code: The group addressed the question - Should the HB44 Taximeter Code address new systems equipped with associated equipment such as: point of sale (POS); global positioning satellite (GPS); and mobile data terminals (MDTs)?

Background:
The existing Taximeters code was written prior to the emergence of taximeter systems that include the types of technology listed above. Many of the requirements in the code are focused on mechanical types and some early electronic based taximeters. The NIST Office of Weights and Measures (OWM) has received an increasing number of inquiries regarding the shortcomings of the NIST HB 44 Taximeters code to addresses electronic taximeters that now have enhanced capabilities beyond interfacing with printers and card readers. Charges for hire of the vehicle have expanded beyond the basic fare charges for distance, time, and extra fees for baggage and additional passengers. Today's electronic taximeters are comprised of a more complex assembly of software driven measuring, indicating, and recording elements used to determine charges in the hire of vehicle or a point-of-sale system (POS).

Taximeters are no longer stand alone devices limited from providing information by the size of the display, lack of a printer, and design of the LED/LCD segment display. Some in the taxi industry are considering the use of global positioning satellite (GPS) applications that are used to calculate charges for hire of the vehicle. Others in the taxi industry are using mobile data terminals which are computerized terminals with interactive monitor screens that communicate with the taximeter to become an integral component in the taximeter POS. In addition to refining existing Taximeters code requirements there is an urgency to provide guidance as to whether or not these latest innovations and practices meet the spirit of weights and measures philosophy and therefore meet the intent of the code.

Discussion:
The existing Taximeter Code was written prior to the emergence of taximeter systems that include the types of technology listed above. Many of the requirements in the existing Taximeters code are focused on mechanical types and some earlier generations of electronic type taximeters. Currently, systems including multiple displays, multiple data inputs and expanded capabilities such as the display of advertisements, credit card readers, etc. are entering the market and there is a substantial lack of device specific regulatory guidelines needed to address the advanced systems.

With regard to POS systems, the group expressed concerns related to the capability of additional displays and what type of information should be required on additional passenger displays. Some systems also include secondary (apart from the taximeter) data input terminals, and the group

also expressed concern related to the capability of these terminals and their ability to input information that can alter passenger charges.

There were many questions expressed by the initial group regarding GPS systems including the following:

- How to adequately define these devices. What elements comprise the measuring ability of these systems? What elements need to be regulated?
- What are the potential capabilities of these systems (i.e., accuracy, reliability)
- What methodology and types of parameter data do GPS systems provide, store, or use to calculate charges for hire of vehicle?
- What influence factors are GPS subject to that can affect the performance? What are the potential sources of errors to GPS systems?
- How can traceability of GPS measurements be maintained?
- What are the mechanics of these systems? How are they calibrated?
- What type of software is required for GPS operation, and what is needed to secure the metrological elements of that software?
- What is the potential for fraudulent use of these systems?
- Are there new test procedures needed to evaluate the system's performance?
- If it is determined necessary, how will the use of components within the system be regulated when they are owned and operated by different parties (i.e., the use of mobile phones to dispatch and track a taxi)?

Another topic of discussion involved the consideration of Mobile Data Terminals (MDT). This technology and its complete functionality is not yet fully understood by the members of the group and more data will be needed from industry before new provisions to address MDTs can be proposed to amend the Taximeter code.

The group is aware that MDTs may be used to supplement or replace some of the functions normally performed by a traditional taximeter, and that the operation of these devices may rely on GPS systems.

The group agreed that these devices should be addressed within the code. The group also expressed the need to initially develop a definition for MDTs in Appendix D (Definitions) of Handbook 44. Some draft language for this

definition was considered by the group; however there was no consensus for a final proposed definition.

Conclusions:

- The group was in agreement that the revised Code should encompass POS systems that are being installed in association with taximeters and used in a few major metropolitan areas. It is recommended that a definition for POS systems (associated with taximeters) should be developed and included in Handbook 44 Appendix D. This definition may include the following legally relevant components:
    - Taximeter;
    - Printer;
    - Card reader;
    - Controller, MDT;
    - Driver and passenger displays;
    - Driver and passenger inputs (i.e., keypads, touch screens)
- The group recognizes that the type of equipment listed above may be dependent on various types of software for its operation, and that any software used in conjunction with taximeters having an effect on metrological aspects of the system is a standard device feature that must be secured and identified. This lead into the discussion of method of sealing of taximeters/systems and is shown later in this summary under section *B. Other Items, II. Provision for sealing metrological components*
- The group also concluded that addressing GPS systems within the scope of the Taximeters code may be problematic at this time. The perceived difficulty involved to include GPS systems in the Taximeters code is based largely on a lack of information and expertise within the group regarding this type of technology. If this technology is to be included within the objectives of the group, then any necessary changes to the Taximeters code will need to be addressed by a larger work group that would include expertise in this area.
- A new requirement (**A.2. Associated Equipment)** was drafted to address the application of the code to some of the associated equipment noted above by stating the code is applicable to that equipment which is metrologically relevant. Draft language was added to paragraph **A.1. General** which is taken from the international standard for taximeters,

OIML R21. This language clarifies that the calculations used to determine fares are based on time and distance measuring devices located *on* or *in* the vehicle.

C. Other Items

I. Distance measuring mechanism

The group has received limited information pertaining to taximeter devices that receive distance measuring input through the vehicle's on-board computer. Several unanswered questions were identified, including "Where is the distance measuring device located, and how does this equipment receive the necessary input"?

Earlier generations of taximeters received pulses from mechanical components driven by wheels, axles, transmission, etc. It is the understanding of the group that pulses are now being received through the vehicle's on-board computer which will then be converted to distance traveled based on calibration factors. Other devices such as amplifiers, conditioners, and dividers are also necessary for component-to-component recognition and to allow a proper pulse signal be sent to the taximeter. The group discussed the need to apply security seals on dividers with multiple ratio capability, and questioned what the potential is for misuse or unauthorized adjustments to these devices.

Additional questions that remain to be answered include:

- What means are needed to verify the accuracy of this pulse generation?
- How is this advanced type of distance measuring mechanism calibrated?
- What methods are needed to seal these mechanisms?

II. Provision for sealing metrological components

Recent proposals before the National Conference on Weights and Measures for recognition of electronic forms of security for taximeters have failed to gain support from weights and measures officials. It is apparent that many jurisdictions wish to maintain the requirement of a physical seal on meters. These jurisdictions would recommend that physical seals be required until guidelines are developed and made available regarding the operation and inspection of this form of security. Much of the support for electronic security for taximeters has come from industry. This support expresses the desire to

be able to use electronic/audit trail type of security on parameters that affect the metrological integrity of the taximeter system.

Discussion:

The participants in the initial group have received information that a number of individuals within the taximeter industry (manufacturers and users of taximeters) have stated that physical seals are problematic because they will eventually become broken and detached due to normal use and the taximeter being taken in and out of the taxicabs. It would also be inconvenient to break the physical seal in order to make frequent routine changes, and that many advanced systems now are capable of receiving parameter changes through remote means.

It has also been stated by regulatory officials that a physical seal can be used more easily to verify that programmable parameters in the taximeter have or have not been accessed.

Conclusion:

The group agreed that taximeters interfaced with POS systems should be sealed with a combination of a physical seal and event loggers, and that a need for requirements addressing the use of audit trail security means should be incorporated into the revised Taximeters code. It was the belief of the group that remote access to metrologically relevant features of a taximeter should not be unlimited and that a physical seal should also be required to be broken prior to any changes being made. This would provide a visual indication to regulatory agents (and possibly passengers as well) that the meter has potentially undergone adjustment.

The group began to develop a list of sealable parameters associated with taximeters/systems as shown below.

The group also agreed to draft a table of acceptable device categories and corresponding methods of sealing for securing legal metrology features to include certain levels of audit trail security for the weights and measures community to consider including within the Taximeters code to better align it with other HB 44 codes. This draft is shown in Addendum I at the end of this summary.

In addition, the proposed new table includes language to recognize unique electronic links (e.g., firmware) if taximeters are to be interfaced with other components in at system. This type of link would prevent these components from being used with other meters or other equipment that may have a detrimental effect on the metrological integrity of the taximeter system.

Taximeter Features and Parameters	
Typical Features or Parameters to be Sealed	**Typical Features or Parameters NOT Required to be Sealed**

• Calibration (span) factors:
  o Pulse rate (distance) - number of pulses from the distance measuring device per unit of distance
  o Pulse rate (time) - number of pulses from the time measuring device per unit of time
  o Pulse dividers with multiple ratio settings
  o Linearity correction factors
• Clock (real time), and date
• Rate features:
  o Number of different rates
  o Automatic rate changes
• Fares:
  o Initial drop
  o Drop intervals (time & distance)
  o Value of subsequent drops (time & distance)
  o Taxes charged
• Extras charges
	• None were listed at this time

Note: The above examples of adjustments, parameters, and features to be sealed are to be considered "typical" or "normal." This list may not be all-inclusive, and there may be parameters other than those listed which affect the metrological performance of the device and must, therefore, be sealed. If listed parameters or other parameters that may affect the metrological function of the device are not sealed, the manufacturer must demonstrate that the parameter will not affect the metrological performance of the device (e.g., all settings comply with the most stringent requirements of NIST Handbook 44 for the applications for which the device is to be used.)

III. Flat Rate Fares

A flat rate fare is a charge that is an established industry practice that is not based on a distance measuring device. Many states and localities allow transactions where the basis for fares is a flat fee for established routes. Owners of taxicab companies wish to maintain the ability to enter this type of fare in the taxi meter so that a record of fares charged for all types of transactions are available through the meter.

Discussion/Conclusion:

To address flat rates within the HB44 Taximeter Code is an issue that is open for discussion. This type of fare is used for commonly traveled routes such as from an airport to a hotel district. These charges are not directly determined using a distance measuring device but rather an established general distance between two given points. While it can be argued that a flat rate charged for a fare to deliver a passenger from a set origin to a set destination can be based on that distance from beginning point to end point, this type of fare charge would not take into consideration any variation from a given route nor does it take into consideration any calculation of fare based on time as is customary in a taximeter.

Another type of flat rate discussed by the group was “negotiated flat rate”. This term is applied to the fare charged following a negotiation process between driver and passenger. This method of determining a fare is not based on an established distance between a specific set point of origin and a set point of destination but is instead a fare applied to a random travel route desired by a passenger. The negotiation would be based on each party’s (driver and passenger) perceived value of transportation from the location where the passenger is picked up and transported to their stated destination. It is reasonable to assume that there can be subjective factors (from either party) that may influence this negotiation. Factors such as time of day, weather, fatigue, and emotional condition of either passenger or driver may cause the price of the fare to increase or decrease.

If negotiated flat rates are to be included within the Taximeters code, it should be recognized that not all jurisdictions will permit this type of flat rate to be used as a basis for fares. It may be recommended therefore that references to negotiated flat rates should be prefaced with a qualifying statement such as: “In those jurisdictions where negotiated flat rates are permitted. . .”

To ensure that the passenger is provided with a clear statement of charges and to prevent ambiguity in the representation of the fare charged, certain requirements should be drafted and included in the Taximeter Code. The following are suggestions to fulfill this purpose.

- If the use of negotiated flat fares is permitted, the input of flat rate fare in the taximeter should be required to be entered in the meter prior to any movement of the cab
- The fare entered should not be subject to advancement and should remain visible to the customer on the display until the transaction is completed.
- The input of a flat rate fare should also require the entry of a point of origin and a destination.
- These entries should be included as required information on printed customer receipts.

The group agreed that the terms “flat rate” and “negotiated flat rate” are not well defined. The need to add this terminology to NIST Handbook 44, Appendix D was discussed based on the accepted use of this type of fare in certain jurisdictions. The group drafted the following two new definitions for terms associated with flat rate fares (in connection with taximeters) and

included the proposed definitions in the amendments to the taximeters code in addendum II to read:

flat rate. – a predetermined, fixed fare indicated on the taximeter based on a set point of origin and a set destination point.[5.54]

and;

negotiated flat rate. - a fixed fare that is not predetermined and is based on a destination point that is agreed upon by both driver and passenger which is then entered into the taximeter by the taxi driver.[5.54]

It is also recommended that if this type of fare is permitted, it must be properly identified on a printed receipt.

IV. Indication of Transaction Information - Power outages, equipment failure

Type evaluation laboratories have encountered problems with certain equipment that is interfaced with taximeters when power to this equipment is interrupted. It has been shown that during evaluations, when power is interrupted and then restored to the system, not all of the displays within the system will agree.

Discussion:
The group discussed this item in terms of what recourse is available to determine a fare if power is lost or if any major component of a system experiences a failure prior to a completed transaction (mid-fare). Although NIST Handbook 44 Taximeters code currently addresses power interruption to electronic taximeters (S.6. Power Interruptions, Electronic Taximeters) HB44 does not address the displays of associated equipment found in newer systems. The group was in agreement that there must be amendments to the Taximeters code to address additional passenger displays.

Conclusion:
Considering this problem, the group agreed that once power is restored to a taximeter system that includes peripheral equipment such as additional displays/inputs and printers, all displays of relevant information (e.g., time/distance used in calculation of fare, extras charges) must agree within the system. Furthermore, the failure of a major component within a system should result in the cessation of advancement of any fare charges until the failure is corrected. A printed receipt for the transaction shall be generated and the display of fares and any extras charges should be maintained for a period long enough so that the transaction taking place at the time of

power loss/equipment failure can be concluded. The group recommended borrowing language from the HB44 Liquid Measuring Devices code, paragraph **S.1.6.2. Provisions for Power Loss** for use in the development of similar requirement in the Taximeters code such as the draft requirement shown below:

S.6.1. Taximeters Interfaced With POS Systems. – For taximeters that are interfaced with point of sale (POS) systems, all components of that system shall be fully functional as designed. The taximeter shall conclude the transaction upon the failure of any of the system components, and may not begin a new transaction before the failure is repaired. A printed record of the transaction taking place at the time of the failure shall be generated and be available to the passenger.
[Nonretroactive as of January 1, 20XX]

V. Extras

A number of "extras" charges are allowed in various jurisdictions and have been included in the total cost of a transaction along with the basic fare for time/distance. Extra charges for additional passengers and for transporting/handling of passenger's luggage are well established in the industry, however many taxi services wish to include charges other than time/distance fares. These additional charges may include: surcharges; taxes; tolls; etc. Current Handbook 44 Taximeter Code requirement S.1.9. (g) pertains to recorded representations and states that "*additional charges where permitted such as extras, surcharge, telephone use, tip, tolls, and tax shall be identified and itemized".* While these types of charges are now required on a recorded representation, there is no requirement for the display of these charges on primary or remote displays in a system (e.g., "back-seat" or passenger display).

Discussion:
The group agreed that extras charges should be displayed on any associated equipment capable of displaying customer fees. It was also agreed that if the POS systems that are being installed with taximeters that will display charges other than fares determined by time/distance, then these systems should be capable of providing itemized listings of these extra charges. These itemized listings should be detailed enough to provide the passenger with a clear definition of all charges.

Conclusions:
The itemization of toll charges were discussed at some length and the group determined that any toll charges should be identified to the extent that any toll charge can be distinguished from other toll charges that may be included in the total taxicab fee. This may be accomplished by providing

a listing of the various tolls in a region along with identifying numbers, letters, etc.

The group believes that since the extras charges for additional passengers and for passenger luggage have been established and used for many years, it would not be necessary to specifically identify these two types of extras charges if they are the only types of additional fees charged.

In addition to the existing requirement pertaining to recorded representations, the group recommends that all passenger charges should be displayed on associated equipment within a taximeter system. Also, due to the additional space that is typically available on additional displays (compared to traditional taximeters), the display of extra charges should be itemized to provide the passenger a clear understanding of all fees charged.

VI. Ability to change rate schedules

Some states and local weights and measures jurisdictions have allowed the rates charged per distance/time to be changed during the trip/journey for various reasons. These changes to the rate usually involve a premium due to the trip being outside a certain established locale or certain operating hours. These reasons have included:

- nighttime differential rate
- holiday rates
- trips that exceed set mileage limits
- trips that will exceed limits on set fare amounts

Discussion/Conclusions:
The group recognized the legitimate use of certain types of rate changes for these and possibly other reasons not listed above. The current HB44 Taximeter Code does not address these rate changes however the NCWM Publication 14 type evaluation taximeters checklist does address this practice by referencing NIST HB44 General Code requirement **G-S.2. Facilitation of Fraud**. Publication 14 technical policy for type evaluation does not permit rate changes to occur once a fare cycle has started.

The group agreed that there can be legitimate reasons for rate changes to occur during a fare cycle and these reasons should be considered and addressed within HB44 Taximeter Code. Other rate changes such as nighttime or rush hour differentials or changes due to holiday rates should only occur after the conclusion of one transaction or fare and the beginning of another. The group also agreed that in the case of any rate change

which takes place during a fare (mid-fare), the change should only occur immediately following a drop and prior to any advancement of indications leading up to a subsequent drop.

Some rate changes can be automatic and not require any action from the driver of the taxicab. Rate changes caused by travel exceeding set limits on time or distance traveled for instance could occur automatically. The legitimacy of rate changes must be made based on specific, acceptable reasons for the changes (i.e., peak hours/night-time differential, length of trip, holiday rates, etc.). A suggested requirement to be added to the Taximeters Code is shown below:

S.1.4.1.2. Automatic Rate Changes – Automatic rate changes may only occur at the end of a money drop and prior to the initiation of the next consecutive drop and are permitted for differentials including:

a) **trips that exceed a set distance;**

b) **trips that exceed a set time limit;**

c) **day/evening differentials;**

d) **specific days of the week; or**

e) **specific dates (e.g. holidays).**

When a change in rate allowed under (a) and (b) occurs, the change must be identified and clearly displayed to the customer. Automatic rate changes allowed under (c), (d), and (e) above shall not occur after the meter has been set to register charges and before the meter has been cleared for that transaction (i.e., between fares).

(Added 20XX)

The group agreed to further develop proposals for HB44 Taximeters code to include requirements that apply to rate changes.

VII. Other miscellaneous recommendations

The group has recommended other various changes to the HB44 Taximeters code that can be found in the "marked-up" version contained in Addendum I of this summary.

In addition to recommended changes to the HB44 Taximeter Code, the group has drafted definitions for language used in the Taximeters code. These recommended changes to HB44 Appendix D can be found in Addendum II of this summary.

Addendum I:

NIST Handbook 44, Taximeter Code

Draft Amendments

All recommended changes are shown in **bold highlighted text**. Text to be deleted is shown as ~~**striking through**~~ the text and language to be added is shown as **underlined** text. Requirements that are proposed to be nonretroactive are printed in ***bold faced italics***.

Section 5.54. Taximeters

A. Application

A.1. General. – This code applies to taximeters; that is, to devices that automatically calculates at a predetermined rate or rates and indicate the charge for hire of a vehicle. **These calculations are based on time and distance measuring devices located on or in the vehicle.**
(Amended 20XX)

A.2 Associated Equipment. – This code also applies to associated equipment that can be interfaced with taximeters and which has any metrological effect on a taximeter such as: POS systems; driver/passenger input devices and displays; and computing types of devices (i.e., Mobile Data Terminals).
(Added 201X)

A.~~2~~3. Exceptions. – This code does not apply to odometers on vehicles that are rented on a distance basis (for which see Section 5.53. Code for Odometers).
(Amended 1977)

A.~~2~~4. Additional Code Requirements. – In addition to the requirements of this code, Taximeters shall meet the requirements of Section 1.10. General Code.

S. Specifications

S.1. Design of Indicating and Recording Elements.

S.1.1. General. – A taximeter shall be equipped with a primary indicating element and may be equipped with a recording element.
(Amended 1988)

S.1.1.1 Point of Sale System. A printed receipt providing the required information in S.1.9. Recorded Representations shall be available through an integral or separate recording element for all transactions conducted with point-of-sale systems
[Nonretroactive 20XX]
(Added 20XX)

S.1.2. Advancement of Indicating Elements. – Except when a taximeter is being cleared, the primary indicating and recording elements shall be susceptible of advancement only by the movement of the vehicle or by the time mechanism**, or by automatic entry of a predetermined fixed rate.**
(Amended 1988, **and 201X**)

S.1.3. Visibility of Indications. – The indications of fare, including extras, and the mode of operation, such as "time" or "hired," shall be constantly displayed whenever the meter is in operation. All indications of passenger interest shall be easily read from a distance of 1.2 m (4 ft) under any condition of normal operation.
(Amended 1977, 1986, and 1988)

S.1.3.1. Minimum Height of Figures, Words, and Symbols. – The minimum height of the figures used to indicate the fare shall be 10 mm and for extras, 8 mm. The minimum height of the figures, words, or symbols used for other indications, including those used to identify or define, shall be 3.5 mm.
(Added 1986)

S.1.3.2. Lighting of Indications. *– Integral lighting shall be provided to illuminate the fare, extras, the rate or rate code, and the taximeter status (i.e., vacant, hired, and time off).*
[Nonretroactive as of January 1, 1989]
(Added 1988) (Amended 1990)

S.1.3.3. Customer's Indications. – A point-of-sale system's indicating element positioned in the passenger compartment shall clearly display:

(a) indications for all fees and
(b) values that are in agreement with indicated values on all other displays.
[Nonretroactive as of 20XX]

S.1.4. Actuation of Fare-Indicating Mechanism. – When a taximeter designed to calculate fares upon the basis of a combination of distance traveled and time elapsed is operative with respect to fare indication, the fare-indicating mechanism shall be actuated by the distance mechanism whenever the vehicle is in motion at such a speed that the rate of distance revenue equals or exceeds the time rate, and may be actuated by the time mechanism whenever the vehicle speed is less than this and when the vehicle is not in motion. Means shall be provided for the vehicle operator to render the time mechanism either operative or inoperative with respect to the fare-indicating mechanism.
(Amended 1977)

S.1.4.1. Multiple rate taximeters – All rates in use for taximeters equipped to calculate fares at multiple rates must be included in the statement of rates as provided in UR.3.

S.1.4.1.1. Manual Rate Changes – Taximeters equipped with means for rate changes which are not protected by a physical or other means of security seal shall be capable of manual rate changes of predetermined, flat rates only.

S.1.4.1.2. Automatic Rate Changes – Automatic rate changes may only occur at the end of a money drop and prior to the initiation of the next consecutive drop and are permitted for differentials including:

a) **trips that exceed a set distance;**
b) **trips that exceed a set time limit;**
c) **day/evening differentials;**
d) **specific days of the week; or**

e) **specific dates (e.g. holidays).**

When a change in rate allowed under (a) and (b) occurs, the change must be identified and clearly displayed to the customer. Automatic rate changes allowed under (c), (d), and (e) above shall not occur after the meter has been set to register charges and before the meter has been cleared for that transaction (i.e., between fares).

(Added 20XX)

S.1.5. Operating Condition.

S.1.5.1. General. – When a taximeter is cleared **and not registering fare**, the **primary** indication **shall display** "Not Registering," "Vacant," or an equivalent expression ~~shall be shown~~. Whenever a taximeter is set to register charges, it shall indicate "Registering," "Hired," or an equivalent expression and the rate at which it is set shall be automatically indicated, **and the required display information shall not be obscured** (Rate 1 or Rate A, for example).

(Amended 1988)

S.1.5.2. Time not Recording. – When a taximeter is set for fare registration with the time mechanism inoperative, it shall indicate "Time Not Recording" or an equivalent expression.
A taximeter set for fare registration with the time mechanism operating shall provide a clear display (e.g., "Time Recording", "Time Mechanism On") to the passenger indicating the status of the time mechanism.
[Nonretroactive as of January 1, 20XX]

(Amended 1988, **and 20XX**)

S.1.6. Fare Identification. – Fare indications shall be identified by the word "Fare" or by an equivalent expression. Values shall be defined by suitable words or monetary signs.

S.1.7. Extras. – Extras shall be indicated as a separate item and shall not be included in the fare indication. They shall be identified by the word "Extras" or by an equivalent expression. Values shall be defined by suitable words or monetary signs. Means may be provided to totalize the fare and extras if the totalized amount returns to separate indications of fare and extras within 5 seconds or less.

(Amended 1988)

S.1.7.1. – Identification of Extra charges – For extras other than those charges for additional passengers or luggage, these charges shall be identified and provide a clear indication of the nature of the charge. These charges shall be itemized as necessary on the statement of charges as provided for in UR.3. Statement of Rates and also on a printed receipt for the transaction.
[Nonretroactive as of January 1, 20XX]
(Added 20XX)

S.1.7.~~1~~2. Nonuse of Extras. – If and when taximeter extras are prohibited by legal authority or are discontinued by a vehicle operator, the extras mechanisms **or function** shall be rendered inoperable or the extras indications shall be **disabled or** effectively obscured by permanent means.

S.1.8. Protection of Indications. – Indications of fare and extras shall be ~~displayed through and entirely protected by glass or other suitable transparent material securely attached to the housing of the taximeter~~ **protected from unauthorized alteration or manipulation.**
(Amended 20XX)

S.1.9. ***Recorded Representation.*** *– A printed receipt issued from a taximeter, whether through an integral or separate recording element, shall include the following:*

(a) date;

*(b) unique vehicle identification number, such as the medallion number, taxi number, vehicle identification number (VIN) or permit number;**

*(c) start and end time of trip;**

*(d) distance traveled, maximum increment of 0.1 kilometer (0.1 mile);**

(e) fare in $;

*(f) for multi-rate taximeters, each rate at which fare was computed and the associated fare at that rate;**

*(g) additional charges where permitted such as extras, surcharge, telephone use, tip, tolls, and tax shall be identified and itemized;**

(h) total fare charges based on distance and total fare charges based on time; and*

*(i) total fare in $ (total charge).**

(j) any credits or discounts applied to the fare**

(k) the name of the taxicab company or owner**

The customer may elect to receive this information in the form of an electronic receipt made available to the customer's personal device.

[Nonretroactive as of January 1, 1989]
**[Nonretroactive as of January 1, 2000]*
*****[Nonretroactive as of January 1, 20XX]***

(Added 1988) (Amended 1999)

S.1.9.1. Multiple Recorded Representations.

S.1.9.1.1. ***Duplicate Receipts.*** *– A recording element may produce a duplicate receipt for the previous transaction provided the information printed is identical to the original with the exception of time issued. The duplicate receipt shall include the words "duplicate" or "copy." The feature to print a duplicate receipt shall be deactivated at the time the meter is hired for the next fare.*
[Nonretroactive as of January 1, 2000]
(Added 1999)

S.1.10. ***Non-fare Information.*** *– The fare and extras* ***display area on the primary*** *display~~s~~ may be used to display auxiliary information provided the meter is in the vacant condition and such information is only displayed for10 seconds, or less. If the information consists of a list of information, the list may be displayed one item after another, provided that each item is displayed for 10 seconds, or less.* ***The indications of fare and extras shall be displayed every 2 minutes for a minimum of 30 seconds.***
[Nonretroactive as of January 1, 2002]
(Added 2000)**(Amended 20XX)**

S.2. Basis of Fare Calculations. – A taximeter shall calculate fares only upon the basis of:

(a) distance traveled;

(b) time elapsed; ~~or~~

(c) a combination of distance traveled and time elapsed**; or**

(d) a negotiated flat rate.

(Amended 1977 **and 20XX**)

S.2.1. Initial Time and Distance Intervals. – The time and distance intervals of a taximeter shall be directly proportional as expressed in the following formula:

$$\frac{Seconds\ of\ Initial\ Time\ Interval}{Seconds\ per\ Non-Initial\ Time\ Interval} = \frac{Distance\ of\ Initial\ Mileage\ Interval}{Distance\ per\ Non-Initial\ Mileage\ Interval}$$

(Added 1990)

S.3. Design of Operating Control.

S.3.1. Positions of Control. – The several positions of the operating controls shall be clearly defined and shall be so constructed that accidental or inadvertent changing of the operating condition of the taximeter is improbable. Movement of the operating controls to an operating position immediately following movement to the cleared position shall be delayed enough to permit the taximeter to come to a complete rest in the cleared position.

(Amended 1988)

S.3.2. ~~**Flag.** – If the control for the operating condition is a lever-arm and flag, the flag shall be at its highest position when the taximeter is cleared, and in this position the whole of the flag shall be above the level of the taximeter housing.~~

Operational Controls – The effect of all operational controls whether on the meter or on a separate input device shall be readily apparent and visible to the customer.
(Added 20XX)

S.3.3. Control for Extras Mechanism. – The knob, handle, or other means provided to actuate the extras mechanism shall be inoperable whenever the taximeter is cleared.

S.4. Interference. – The design of a taximeter shall be such that there will be no interference between the time and the distance portions of the mechanism device at any speed of operation.

(Amended 1977 and 1988)

S.5. Provision for Security Seals. – Adequate provision shall be made to provide security for a taximeter. Security may be provided either by:

(a) Affixing **physical** security seals to the taximeter and to all other components required for service operation of a complete installation on a vehicle, so that no adjustments, alterations, or replacements affecting accuracy or indications of the device or the assembly can be made without mutilating the seal or seals; ~~or~~

(b) Using a combination of security seals described in paragraph (a) and, in the case of a component that may be removed from a vehicle (e.g., slide mounting the taximeter), providing a physical or electronic link between components affecting accuracy or indications of the device to ensure that its performance is not affected and operation is permitted only with those components having the same unique properties**; or**

(c) For taximeters that are interfaced with enhanced software driven (POS) systems and that are capable of remote configuration, the sealing of calibration and configuration parameters shall be performed through the use of a physical seal that when removed may allow remote configuration. Any changes made after the removal of this physical seal must be recorded in an event logger. (Added 20XX)

The sealing means shall be such that it is not necessary to disassemble or remove any part of the device or of the vehicle to apply or inspect the seals.

(Amended 1988, 2000**, and 20XX**)

[Audit trails shall use the format set forth in Table S.5. Categories of Device and Methods of Sealing]*

[*Nonretroactive as of January 1, 20XX]

Table S.5. Categories of Device and Methods of Sealing	
Categories of Device	***Methods of Sealing***
Category 1: No remote configuration capability.	***Seal by physical seal or a combination of physical seals and for components that may be removed from the vehicle, a physical or electronic link as described in (b) above.***
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 and two event loggers: one for calibration parameters and one for configuration parameters. The event loggers are required in the device; they must include event counters (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. The event loggers shall have a capacity to retain records equal to 10 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, 20XX]

(Table added 20XX)

S.6. Power Interruption, Electronic Taximeters.

(a) After a power interruption of 3 seconds or less, the fare and extras indications shall return to the previously displayed indications and may be susceptible to advancement without the taximeter being cleared.

(b) After a power interruption exceeding 3 seconds, the fare and extras indications shall return to the previously displayed indications and shall not be susceptible to advancement until the taximeter is cleared.

*After restoration of power following an interruption exceeding 3 seconds, the previously displayed fare shall be displayed for a maximum of 1 minute at which time the fare shall automatically clear and the taximeter shall return to the vacant condition.**

*[*Nonretroactive as of January 1, 2002]*

(Added 1988) (Amended 1989, 1990, and 2000)

S.6.1. Taximeters Interfaced With POS Systems. – For taximeters that are interfaced with point of sale (POS) systems, all components of that system shall be fully functional as designed. The taximeter shall conclude the transaction upon the failure of any of the system components, and may not begin a new transaction before the failure is repaired. A printed record of the transaction taking place at the time of the failure shall be generated and be available to the passenger.
(Added 20XX)

S.7. Anti-fraud Provisions, Electronic Taximeters. - An electronic taximeter may have provisions to detect and eliminate distance input that is inconsistent with output of the vehicle's distance sensor. When a taximeter equipped with this feature detects input inconsistent with the distance sensor:

(a) The meter shall either filter out the inconsistent distance input signals or cease to increment fare based on distance until the distance input signal returns to normal. If the meter ceases to increment fare based on distance, the taximeter may continue to increment fare based on elapsed time;

(b) The taximeter shall provide a visible or audible signal that inconsistent input signals are being detected; and

(c) The taximeter shall record the occurrence in an event logger. The event logger shall include an event counter (000 to 999), the date, and the time of at least the last 1000 occurrences.

(Added 2001)

N. Notes

N.1. Distance Tests.

N.1.1. Test Methods. – To determine compliance with distance tolerances, a distance test of a taximeter shall be conducted utilizing one or more of the following test methods:

(a) **Road Test.** – A road test consists of driving the vehicle over a precisely measured road course.

(b) **Fifth-Wheel Test.** – A fifth-wheel test consists of driving the vehicle over any reasonable road course and determining the distance actually traveled through the use of a mechanism known as a "fifth wheel" that is attached to the vehicle and that independently measures and indicates the distance.

(c) **Simulated-Road Test.** – A simulated road test consists of determining the distance traveled by use of a roller device, or by computation from rolling circumference and wheel-turn data.

(d) Simulated Lab Test During Type Evaluation – A lab test consisting of the use of an electronic pulse generator or pulse simulator to replicate distance input and a certified stop watch to verify time intervals calculations.

(Amended 1977 **and 20XX**)

N.1.2. Test Procedures. – The distance test of a taximeter, whether a road test, a simulated-road test, or a fifth-wheel test, shall include at least duplicate runs of sufficient length to cover at least the third money drop or 1 mi, whichever is greater, and shall be at a speed approximating the average speed traveled by the vehicle in normal service. In the case of metric-calibrated taximeters, the test should cover at least the third money drop or 2 km, whichever is greater.

(Amended 1977)

N.1.3. Test Conditions.

N.1.3.1. Vehicle Lading. – During the distance test of a taximeter, the vehicle shall carry two persons, or in the case of a simulated-road test, 70 kg or 150 lb of test weights may be substituted in lieu of the second person.

N.1.3.2. Tire Pressure. – At the completion of test run or runs, the tires of the vehicle under test shall be checked to determine that the tire pressure is that operating tire pressure posted in the vehicle. If not, the tire pressure should be adjusted to the posted tire pressure and further tests may be conducted to determine the operating characteristics of the odometer.

(Amended 1977)

N.2. Time Test. – If a taximeter is equipped with a timing device through which charges are made for time intervals, the timer shall be tested at the initial interval, four separate subsequent intervals, and an average time test of at least four consecutive subsequent time intervals.

(Amended 1988)

N.3. Interference Test. – If a taximeter is equipped with a timing device through which charges are made for time intervals, a test shall be conducted to determine whether there is interference between the time and distance elements. During the interference test, the vehicle's operating speed shall be 3 km/h or 4 km/h, or 2 mi/h or 3 mi/h faster than the speed at which the basic distance rate equals the basic time rate. The basic rate per hour divided by the basic rate per mile is the speed (km/h or mi/h) at which the basic time rate and basic distance rate are equal.

(Amended 1988)

T. Tolerances

T.1. Tolerance Values.

T.1.1. On Distance Tests. – Maintenance and acceptance tolerances for taximeters shall be as follows:

(a) On Overregistration: 1 % of the interval under test.

(b) On Underregistration: 4 % of the interval under test, with an added tolerance of 30 m or 100 ft whenever the initial interval is included in the interval under test.

T.1.2. On Time Tests.

T.1.2.1. On Individual Time Intervals. – Maintenance and acceptance tolerances on individual time intervals shall be as follows:

- (a) On Overregistration: 3 seconds per minute (5 %).
- (b) On Underregistration: 9 seconds per minute (15 %) on the initial interval, and 6 seconds per minute (10 %) on subsequent intervals.

T.1.2.2. On Average Time Interval Computed After the Initial Interval. – Except for the initial interval, maintenance and acceptance tolerances on the average time interval shall be as follows:

(a) On Overregistration: 0.2 second per minute (0.33 %).

(b) On Underregistration: 3 seconds per minute (5 %).

(Amended 1991)

T.1.3. On Interference Tests.

T.1.3.1. The registration of a taximeter in the "time on" position shall agree within 1 % of its performance in the "time off" position.

(Added 1988)

UR. User Requirements

UR.1. Inflation of Vehicle Tires. – The operational tire pressure of passenger vehicles and truck tires shall be posted in the vehicle and shall be maintained at the posted pressure. **The required tire size shall also be posted in the vehicle.**

(Amended 1977 **and 20XX**)

UR.2. Position and Illumination of Taximeter. – A taximeter shall be so positioned and illuminated that its indications, operational markings, and controls of passenger interest can be conveniently read by a passenger seated in the back seat of the vehicle.

(Amended 1985 and 1986)

UR.3. Statement of Rates. – The distance, ~~and~~ time **and flat or fixed** rates for which a taximeter is set, including the initial distance interval and the initial time interval, the local tax rate, and the schedule of extras when an extras indication is provided shall be conspicuously displayed inside the front and rear passenger compartments. The words "Rate," "Rates," ~~or~~ "Rates of Fare," **or "Flat or Fixed Rate"** shall precede the rate statement. The rate statement shall be fully informative, self explanatory, and readily understandable by the ordinary passenger, and shall either be of a permanent character or be protected by glass or other suitable transparent material. **For extras where the charges vary within a subset of extras (e.g. different toll rates), these extras will be itemized and specifically identified.**

(Amended 1977, 1988, 1990, ~~and~~ 1999**, and 20XX**)

Addendum II

HB 44 Appendix D – Definitions

Appendix D. Definitions

The specific code to which the definition applies is shown in [brackets] at the end of the definition. Definitions for the General Code [1.10] apply to all codes in Handbook 44.

A

absolute value. – The absolute value of a number is the magnitude of that number without considering the positive or negative sign.[2.20]

acceptance test. – The first official test of a farm milk tank, at a particular location, in which the tank is accepted as correct. This test applies to newly constructed tanks, relocated used tanks, and recalibrated tanks.[4.42]

accurate. – A piece of equipment is "accurate" when its performance or value – that is, its indications, its deliveries, its recorded representations, or its capacity or actual value, etc., as determined by tests made with suitable standards - conforms to the standard within the applicable tolerances and other performance requirements. Equipment that fails so to conform is "inaccurate." (See also "correct") [Appendix A]

all-class. – A description of a multi-class calibration that includes all the classes of a grain type.[5.56(a), 5.57]
(Added 2007)

analog or digital recorder. – An element used with a belt-conveyor scale that continuously records the rate-of-flow of bulk material over the scale (formerly referred to as a chart recorder).[2.21]
(Amended 1989)

analog type. – A system of indication or recording in which values are presented as a series of graduations in combination with an indicator, or in which the most sensitive element of an indicating system moves continuously during the operation of the device.[1.10]

animal scale. – A scale designed for weighing single heads of livestock.[2.20]
(Amended 1987)

apparent mass versus 8.0 g/cm^3. – The apparent mass of an object versus 8.0 g/cm^3 is the mass of material of density 8.0 g/cm^3 that produces exactly the same balance reading as the object when the comparison is made in air with a density of 1.2 mg/cm^3 at 20 °C.[3.37]

approval seal. – A label, tag, stamped or etched impression, or the like, indicating official approval of a device. (Also see "security seal.")[1.10]

assumed atmospheric pressure. – The average atmospheric pressure agreed to exist at the meter at various ranges of elevation, irrespective of variations in atmospheric pressure from time to time.[3.33]

audit trail. – An electronic count and/or information record of the changes to the values of the calibration or configuration parameters of a device.[1.10, 2.20, 2.21, 2.24, 3.30, 3.37, **5.54,** 5.56(a)]

(Added 1993)

automatic bulk weighing system. – A weighing system adapted to the automatic weighing of bulk commodities in successive drafts of predetermined amounts, automatically recording the no-load and loaded weight values and accumulating the net weight of each draft.[2.20]

automatic checkweigher. – An automatic weighing system that does not require the intervention of an operator during the weighing process and used to subdivide items of different weights into one or more subgroups, such as identifying packages that have acceptable or unacceptable fill levels according to the value of the difference between their weight and a pre-determined set point. These systems may be used to fill standard packages for compliance with net weight requirements.[2.24]

(Amended 2004)

automatic gravimetric filling machine (instrument). – A filling machine or instrument that fills containers or packages with predetermined and virtually constant mass of product from bulk by automatic weighing, and which comprises essentially an automatic feeding device or devices associated with one or more weighing unit and the appropriate discharge devices.[2.24]

(Added 2004)

automatic hopper scale. – One adapted to the automatic weighing of bulk commodity in successive drafts of predetermined amounts. (This is not an "automatic-indicating scale" defined below.)[2.20]

automatic rate change. – a predetermined change of the factor applied to the time and/or distance measured used to calculate a fare that occurs one or more times during the trip/journey, and which does not require any operator action upon the taximeter to initiate the change.[5.54]
(Added 20XX)

automatic temperature or density compensation. – The use of integrated or ancillary equipment to obtain from the output of a volumetric meter an equivalent mass, or an equivalent liquid volume at the assigned reference temperature below and a pressure of 14.696 lb/in^2 absolute.

Cryogenic liquids: 21 °C (70 °F)[3.34]
Hydrocarbon gas vapor: 15 °C (60 °F)[3.33]
Liquid carbon dioxide: 21 °C (70 °F)[3.38]
Liquefied petroleum gas (LPG) and Anhydrous ammonia: 15 °C (60 °F)[3.32]
Petroleum liquid fuels and lubricants: 15 °C (60 °F)[3.30]

automatic weighing system (AWS). – An automatic weighing system is a weighing device that, in combination with other hardware and/or software components, automatically weighs discrete items and that does not require the intervention of an operator during the weighing process. Examples include, but are not limited to, weigh-labelers and checkweighers.[2.24]

(Amended 2004)

automatic zero-setting mechanism (AZSM). – See "automatic zero-setting mechanism" under "zero-setting mechanism."[2.22]

(Amended 2010)

automatic zero-setting mechanism (belt-conveyor scale). – A zero setting device that operates automatically without intervention of the operator after the belt has been running empty.[2.21]

(Added 2002)

automatic zero-tracking (AZT) mechanism. – Automatic means provided to maintain the zero balance indication, within specified limits, without the intervention of an operator.[2.20, 2.22, 2.24]

(Amended 2010)

automatic-indicating scale. – One on which the weights of applied loads of various magnitudes are automatically indicated throughout all or a portion of the weighing range of the scale. (A scale that automatically weighs out commodity in predetermined drafts, such as an automatic hopper scale, a packaging scale, and the like, is not an "automatic-indicating" scale.)[2.20. 2.22]

auxiliary indicator. – Any indicator other than the master weight totalizer that indicates the weight of material determined by the scale.[2.21]

axle-load scale. – A scale permanently installed in a fixed location, having a load-receiving element specially adapted to determine the combined load of all wheels (1) on a single axle or (2) on a tandem axle of a highway vehicle.[2.20]

B

badge. – A metal plate affixed to the meter by the manufacturer showing the manufacturer's name, serial number and model number of the meter, and its rated capacity.[3.33]

balance, zero-load. – See "zero-load balance."[2.20]

balance indicator. – A combination of elements, one or both of which will oscillate with respect to the other, for indicating the balance condition of a nonautomatic indicating scale. The combination may consist of two indicating edges, lines, or points, or a single edge, line, or point and a graduated scale.[2.20]

balancing mechanism. – A mechanism (including a balance ball) that is designed for adjusting a scale to an accurate zero-load balance condition.[2.20]

base pressure. – The absolute pressure used in defining the gas measurement unit to be used, and is the gauge pressure at the meter plus an agreed atmospheric pressure.[3.33]

basic distance rate. – The charge for distance for all intervals except the initial interval.[5.54]

basic time rate. – The charge for time for all intervals except the initial interval.[5.54]

basic tolerances. – Basic tolerances are those tolerances on underregistration and on overregistration, or in excess and in deficiency, that are established by a particular code for a particular device under all normal tests, whether maintenance or acceptance. Basic tolerances include minimum tolerance values when these are specified. Special tolerances, identified as such and pertaining to special tests, are not basic tolerances.[1.10]

batching meter. – A device used for the purpose of measuring quantities of water to be used in a batching operation.[3.36]

beam. – See "weighbeam."[2.20]

beam scale. – One on which the weights of loads of various magnitudes are indicated solely by means of one or more weighbeam bars either alone or in combination with counterpoise weights.[2.20]

bell prover. – A calibrated cylindrical metal tank of the annular type with a scale thereon that, in the downward travel in a surrounding tank containing a sealing medium, displaces air through the meter being proved or calibrated. [3.33]

belt-conveyor. – An endless moving belt for transporting material from place to place.[2.21]

belt-conveyor scale. – A device that employs a weighing element in contact with a belt to sense the weight of the material being conveyed and the speed (travel) of the material, and integrates these values to produce total delivered weight.[2.21]

belt-conveyor scale systems area. – The scale system area refers to the scale suspension, weigh idlers attached to the scale suspension, 5 approach (-) idlers, and 5 retreat (+) idlers.[2.21]
(Added 2001)

billed weight. – The weight used in the computation of the freight, postal, or storage charge, whether actual weight or dimensional weight.[5.58]

binary submultiples. – Fractional parts obtained by successively dividing by the number 2. Thus, one-half, one-fourth, one-eighth, one-sixteenth, and so on, are binary submultiples.[1.10]

built-for-purpose device. – Any main device or element which was manufactured with the intent that it be used as, or part of, a weighing or measuring device or system.[1.10]
(Added 2003)

C

calibration parameter. – Any adjustable parameter that can affect measurement or performance accuracy and, due to its nature, needs to be updated on an ongoing basis to maintain device accuracy, e.g., span adjustments, linearization factors, and coarse zero adjustments.[2.20, 2.21, 2.24, 3.30, 3.37, **5.54,** 5.56(a)]
(Added 1993)

carbon dioxide liquid-measuring device. – A system including a mechanism or machine of (a) the meter or (b) a weighing type of device mounted on a vehicle designed to measure and deliver liquid carbon dioxide. Means may be provided to indicate automatically, for one of a series of unit prices, the total money value of the quantity measured.[3.38]

car-wash timer. – A timer used in conjunction with a coin-operated device to measure the time during which car-wash water, cleaning solutions, or waxing solutions are dispensed.[5.55]

center-reading tank. – One so designed that the gauge rod or surface gauge, when properly positioned for use, will be approximately in the vertical axis of the tank, centrally positioned with respect to the tank walls.[4.43]

cereal grain and oil seeds. – Agricultural commodities including, but not limited to, corn, wheat, oats, barley, flax, rice, sorghum, soybeans, peanuts, dry beans, safflower, sunflower, fescue seed, etc.[5.56(a), 5.56(b)]

chart recorder. – See analog or digital recorder.
(Amended 1989)

check rate. – A rate of flow usually 20 % of the capacity rate.[3.33]

checkweighing scale. – One used to verify predetermined weight within prescribed limits.[2.24]

class of grain. – Hard Red Winter Wheat as distinguished from Hard Red Spring Wheat as distinguished from Soft Red Winter Wheat, etc.[5.56(a), 5.56(b), 5.57]

clear interval between graduations. – The distance between adjacent edges of successive graduations in a series of graduations. If the graduations are "staggered," the interval shall be measured, if necessary, between a graduation and an extension of the adjacent graduation. (Also see "minimum clear interval.")[1.10]

cleared. – A taximeter is "cleared" when it is inoperative with respect to all fare indication, when no indication of fare or extras is shown and when all parts are in those positions in which they are designed to be when the vehicle on which the taximeter is installed is not engaged by a passenger.[5.54]

cold-tire pressure. – The pressure in a tire at ambient temperature.[5.53, 5.54]

commercial equipment. – See "equipment."
(Added 2008)

computing scale. – One that indicates the money values of amounts of commodity weighed, at predetermined unit prices, throughout all or part of the weighing range of the scale.[2.20]

computing type or computing type device. – A device designed to indicate, in addition to weight or measure, the total money value of product weighed or measured, for one of a series of unit prices.[1.10]

concave curve. – A change in the angle of inclination of a belt conveyor where the center of the curve is above the conveyor.[2.21]

concentrated load capacity (CLC) (also referred to as Dual Tandem Axle Capacity[DTAC]). – A capacity rating of a vehicle or axle-load scale, specified by the manufacturer, defining the maximum load applied by a group of two axles with a centerline spaced 4 feet apart and an axle width of 8 feet for which the weighbridge is designed. The concentrated load capacity rating is for both test and use.[2.20]
(Added 1988) (Amended 1991, 1994, and 2003)

configuration parameter. – Any adjustable or selectable parameter for a device feature that can affect the accuracy of a transaction or can significantly increase the potential for fraudulent use of the device and, due to its nature, needs to be updated only during device installation or upon replacement of a component, e.g., division value (increment), sensor range, and units of measurement.[2.20, 2.21, 2.24, 3.30, 3.37, **5.54,** 5.56(a)]
(Added 1993)

consecutive-car test train. – A train consisting of cars weighed on a reference scale, then coupled consecutively and run over the coupled-in-motion railway track scale under test.[2.20]
(Added 1990)

construction materials hopper scale. – A scale adapted to weighing construction materials such as sand, gravel, cement, and hot oil.[2.20]

contract sale. – A sale where a written agreement exists, prior to the point of sale, in which both buyer and seller have accepted pricing conditions of the sale. Examples include, but are not limited to: e-commerce, club sales, or pre-purchase agreements. Any devices used in the determination of quantity must comply with NIST Handbook 44. [3.30, 3.32, 3.37]
(Added 1993) (Amended 2002)

conventional scale. – If the use of conversion tables is necessary to obtain a moisture content value, the moisture meter indicating scale is called "conventional scale." The values indicated by the scale are dimensionless.[5.56(b)]

conversion table. – Any table, graph, slide rule, or other external device used to determine the moisture content from the value indicated by the moisture meter.[5.56(b)]

convex curve. – A change in the angle of inclination of a belt conveyor where the center of the curve is below the conveyor.[2.21]

conveyor stringers. – Support members for the conveyor on which the scale and idlers are mounted.[2.21]

correct. – A piece of equipment is "correct" when, in addition to being accurate, it meets all applicable specification requirements. Equipment that fails to meet any of the requirements for correct equipment is "incorrect." (See also "accurate.")[Appendix A]

correction table. – Any table, graph, slide rule, or other external device used to determine the moisture content from the value indicated by the moisture meter when the indicated value is altered by a parameter not automatically corrected for in the moisture meter (for example, temperature or test weight).[5.56(b)]

counterbalance weight(s). – One intended for application near the butt of a weighbeam for zero-load balancing purposes.[2.20]

counterpoise weight(s). – A slotted or "hanger" weight intended for application near the tip of the weighbeam of a scale having a multiple greater than one.[2.20]

coupled-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 coupled in motion.[2.20, 2.23]

(Added 1992)

crane scale. – One with a nominal capacity of 5000 pounds or more designed to weigh loads while they are suspended freely from an overhead, track-mounted crane.[2.20]

cryogenic liquid-measuring device. – A system including a liquid-measuring element designed to measure and deliver cryogenic liquids in the liquid state.[3.34]

(Amended 1986 and 2003)

cryogenic liquids. – Fluids whose normal boiling point is below 120 kelvin (-243 °F).[3.34]

cubic foot, gas. – The amount of a cryogenic liquid in the gaseous state at a temperature of 70 °F and under a pressure of 14.696 lb/in^2 absolute that occupies one cubic foot (1 ft^3). (See NTP.)[3.34]

D

"d," dimension division value. – The smallest increment that the device displays for any axis and length of object in that axis.[5.58]

d, value scale division. – See "scale division, value of (d)."[2.20, 2.22]

D_{max} (maximum load of the measuring range). – Largest value of a quantity (mass) which is applied to a load cell during test or use. This value shall not be greater than E_{max}.[2.20]

(Added 2005)

D_{min} (minimum load of the measuring range). – Smallest value of a quantity (mass) which is applied to a load cell during test or use. This value shall not be less than E_{min}.[2.20]

(Added 2006)

dairy-product-test scale. – A scale used in determining the moisture content of butter and/or cheese or in determining the butterfat content of milk, cream, or butter.[2.20]

decimal submultiples. – Parts obtained by successively dividing by the number 10. Thus 0.1, 0.01, 0.001, and so on are decimal submultiples.[1.10]

decreasing-load test. – A test for automatic-indicating scales only, wherein the performance of the scale is tested as the load is reduced.[2.20, 2.22]
(Amended 1987)

deficiency. – See "excess and deficiency."[1.10]

digital type. – A system of indication or recording of the selector type or one that advances intermittently in which all values are presented digitally, or in numbers. In a digital indicating or recording element, or in digital representation, there are no graduations.[1.10]

dimensional weight (or dim, weight). – A value computed by dividing the object's volume by a conversion factor; it may be used for the calculation of charges when the value is greater than the actual weight.[5.58]
(Added 2004)

direct sale. – A sale in which both parties in the transaction are present when the quantity is being determined. An unattended automated or customer-operated weighing or measuring system is considered to represent the device/business owner in transactions involving an unattended device.[1.10]
(Amended 1993)

discharge hose. – A flexible hose connected to the discharge outlet of a measuring device or its discharge line.[3.30, 3.31, 3.32, 3.34, 3.37, 3.38]
(Added 1987)

discharge line. – A rigid pipe connected to the outlet of a measuring device.[3.30, 3.31, 3.32, 3.34, 3.37]
(Added 1987)

discrimination (of an automatic-indicating scale). – The value of the test load on the load-receiving element of the scale that will produce a specified minimum change of the indicated or recorded value on the scale.[2.20, 2.22]

dispenser. – See motor-fuel device.[3.30, 3.37]

distributed-car test train. – A train consisting of cars weighed first on a reference scale, cars coupled consecutively in groups at different locations within the train, then run over the coupled-in-motion railway track scale under test. The groups are typically placed at the front, middle, and rear of the train.[2.20]
(Added 1990)

dry hose. – A discharge hose intended to be completely drained at the end of each delivery of product. (See "dry-hose type.")[3.30, 3.31]
(Amended 2002)

dry-hose type. – A type of device in which it is intended that the discharge hose be completely drained following the mechanical operations involved in each delivery. (See "dry hose.")[3.30, 3.31, 3.34, 3.35]

dynamic monorail weighing system. – A weighing system which employs hardware or software to compensate for dynamic effects from the load or the system that do not exist in static weighing, in order to provide a stable indication. Dynamic factors may include shock or impact loading, system vibrations, oscillations, etc., and can occur even when the load is not moving across the load-receiving element.[2.20]
(Added 1999)

E

e, value of verification scale division. – See "verification scale division, value of (e)."[2.20]

emin (minimum verification scale division). – The smallest scale division for which a weighing element complies with the applicable requirements.[2.20, 2.21, 2.24]
(Added 1997)

Emax (maximum capacity). – Largest value of a quantity (mass) which may be applied to a load cell without exceeding the mpe.[2.20]

(Added 2005)

Emin (minimum dead load). – Smallest value of a quantity (mass) which may be applied to a load cell during test or use without exceeding the mpe.[2.20]

(Added 2006)

electronic link. – An electronic connection between the weighing/load-receiving or other sensing element and indicating element where one recognizes the other and neither can be replaced without calibration.[2.20, **5.54**]

(Added 2001)

element. – A portion of a weighing or measuring device or system which performs a specific function and can be separated, evaluated separately, and is subject to specified full or partial error limits.

(Added 2002)

equal-arm scale. – A scale having only a single lever with equal arms (that is, with a multiple of one), equipped with two similar or dissimilar load-receiving elements (pan, plate, platter, scoop, or the like), one intended to receive material being weighed and the other intended to receive weights. There may or may not be a weighbeam.[2.20]

equipment, commercial. – Weights, measures, and weighing and measuring devices, instruments, elements, and systems or portion thereof, used or employed in establishing the measurement or in computing any basic charge or payment for services rendered on the basis of weight or measure. As used in this definition, measurement includes the determination of size, quantity, value, extent, area, composition (limited to meat and poultry), constituent value (for grain), or measurement of quantities, things, produce, or articles for distribution or consumption, purchased, offered, or submitted for sale, hire, or award.[1.10, 2.20, 2.21, 2.22, 2.24, 3.30, 3.31, 3.32, 3.33, 3.34, 3.35, 3.38, 4.40, 5.51, **5.54**, 5.56.(a), 5.56.(b), 5.57, 5.58, 5.59]

(Added 2008)

event counter. – A nonresettable counter that increments once each time the mode that permits changes to sealable parameters is entered and one or more changes are made to sealable calibration or configuration parameters of a device.[2.20, 2.21, 3.30, 3.37, 5.54, 5.56(a), 5.56(b), 5.57]

(Added 1993)

event logger. – A form of audit trail containing a series of records where each record contains the number from the event counter corresponding to the change to a sealable parameter, the identification of the parameter that was changed, the time and date when the parameter was changed, and the new value of the parameter.[2.20, 2.21, 3.30, 3.37, 5.54, 5.56(a), 5.56(b), 5.57]

(Added 1993)

excess and deficiency. – When an instrument or device is of such a character that it has a value of its own that can be determined, its error is said to be "in excess" or "in deficiency," depending upon whether its actual value is, respectively, greater or less than its nominal value. (See "nominal.") Examples of instruments having errors "in excess" are: a linear measure that is too long; a liquid measure that is too large; and a weight that is "heavy." Examples of instruments having errors "in deficiency" are: a lubricating-oil bottle that is too small; a vehicle tank compartment that is too small; and a weight that is "light."[1.10]

extras. – Charges to be paid by a passenger in addition to the fare, including any charge at a flat rate for the transportation of passengers in excess of a stated number and any charge for the transportation of baggage.[5.54]

F

face. – That side of a taximeter on which passenger charges are indicated.[5.54]

face. – That portion of a computing-type pump or dispenser which displays the actual computation of price per unit, delivered quantity, and total sale price. In the case of some electronic displays, this may not be an integral part of the pump or dispenser.[3.30]
(Added 1987)

fare. – That portion of the charge for the hire of a vehicle that is automatically calculated by a taximeter through the operation of the distance and/or time mechanism.[5.54]

farm milk tank. – A unit for measuring milk or other fluid dairy product, comprising a combination of (1) a stationary or portable tank, whether or not equipped with means for cooling its contents, (2) means for reading the level of liquid in the tank, such as a removable gauge rod or a surface gauge, and (3) a chart for converting level-of-liquid readings to volume; or such a unit in which readings are made on a gauge rod or surface gauge directly in terms of volume. Each compartment of a subdivided tank shall, for purposes of this code, be construed to be a "farm milk tank."[4.43]

feeding mechanism. – The means for depositing material to be weighed on the belt conveyor.[2.21]

fifth wheel. – A commercially-available distance-measuring device which, after calibration, is recommended for use as a field transfer standard for testing the accuracy of taximeters and odometers on rented vehicles.[5.53, 5.54]

fifth-wheel test. – A distance test similar to a road test, except that the distance traveled by the vehicle under test is determined by a mechanism known as a "fifth wheel" that is attached to the vehicle and that independently measures and indicates the distance.[5.53, 5.54]

flag. – A plate at the end of the lever arm or similar part by which the operating condition of a taximeter is controlled and indicated.[5.54]

flat rate. – a predetermined, fixed fare indicated on the taximeter based on a definite and specific point of origin and a definite and specific destination point. [5.54]

fractional bar. – A weighbeam bar of relatively small capacity for obtaining indications intermediate between notches or graduations on a main or tare bar.[2.20]

ft3/h. – Cubic feet per hour.[3.33]

G

gasoline gallon equivalent (GGE). – Gasoline gallon equivalent (GGE) means 5.660 pounds of natural gas.[3.37]
(Added 1994)

gasoline liter equivalent (GLE). – Gasoline liter equivalent (GLE) means 0.678 kilograms of natural gas.[3.37]
(Added 1994)

gauge pressure. – The difference between the pressure at the meter and the atmospheric pressure (psi).[3.33]

gauge rod. – A graduated, "dip-stick" type of measuring rod designed to be partially immersed in the liquid and to be read at the point where the liquid surface crosses the rod.[4.42]

gauging. – The process of determining and assigning volumetric values to specific graduations on the gauge or gauge rod that serve as the basis for the tank volume chart.[4.42]

graduated interval. – The distance from the center of one graduation to the center of the next graduation in a series of graduations. **–** (Also see "value of minimum graduated interval.")[1.10]

graduation. – A defining line or one of the lines defining the subdivisions of a graduated series. The term includes such special forms as raised or indented or scored reference "lines" and special characters such as dots. (Also see "main graduation" and "subordinate graduation.")[1.10]

grain class. – Different grains within the same grain type. For example, there are six classes for the grain type "wheat:" Durum Wheat, Hard Red Spring Wheat, Hard Red Winter Wheat, Soft Red Winter Wheat, Hard White Wheat, and Soft White Wheat.[5.56(a), 5.57]
(Added 2007)

grain hopper scale. – One adapted to the weighing of individual loads of varying amounts of grain.[2.20]

grain moisture meter. – Any device indicating either directly or through conversion tables and/or correction tables the moisture content of cereal grains and oil seeds. Also termed "moisture meter."[5.56(a), 5.56(b)]

grain sample. – That portion of grain or seed taken from a bulk of grain or seed to be bought or sold and used to determine the moisture content of the bulk.[5.56(a), 5.56(b)]

grain-test scale. – A scale adapted to weighing grain samples used in determining moisture content, dockage, weight per unit volume, etc.[2.20]

grain type. – See "kind of grain."[5.56(a), 5.57]
(Added 2007)

gravity discharge. – A type of device designed for discharge by gravity.[3.30, 3.31]

H

head pulley. – The pulley at the discharge end of the belt conveyor. The power drive to drive the belt is generally applied to the head pulley.[2.21]

hexahedron. – A geometric solid (i.e., box) with six rectangular or square plane surfaces.[5.58]
(Added 2008)

hired. – A taximeter is "hired" when it is operative with respect to all applicable indications of fare or extras. The indications of fare include time and distance where applicable unless qualified by another indication of "Time Not Recording" or an equivalent expression.[5.54]

hopper scale. – A scale designed for weighing bulk commodities whose load-receiving element is a tank, box, or hopper mounted on a weighing element. (Also, see "automatic hopper scale," "grain hopper scale," and "construction materials hopper scale."[2.20]

I

idler space. – The center-to-center distance between idler rollers measured parallel to the belt.[2.21]

idlers or idler rollers. – Freely turning cylinders mounted on a frame to support the conveyor belt. For a flat belt, the idlers consist of one or more horizontal cylinders transverse to the direction of belt travel. For a troughed belt, the idlers consist of one or more horizontal cylinders and one or more cylinders at an angle to the horizontal to lift the sides of the belt to form a trough.[2.21]

in-service light indicator. – A light used to indicate that a timing device is in operation.[5.55]

increasing-load test. – The normal basic performance test for a scale in which observations are made as increments of test load are successively added to the load-receiving element of the scale.[2.20, 2.22]

increment. – The value of the smallest change in value that can be indicated or recorded by a digital device in normal operation.[1.10]

index of an indicator. – The particular portion of an indicator that is directly utilized in making a reading.[1.10]

indicating element. – An element incorporated in a weighing or measuring device by means of which its performance relative to quantity or money value is "read" from the device itself as, for example, an index-and-graduated-scale combination, a weighbeam-and-poise combination, a digital indicator, and the like. (Also see "primary indicating or recording element.")[1.10]

indicator, balance. – See "balance indicator."[2.20]

initial distance or time interval. – The interval corresponding to the initial money drop.[5.54]

initial zero-setting mechanism. – See "initial zero-setting mechanism" under "zero-setting mechanism."[2.20]
(Added 1990)

interval, clear, between graduations. – See "clear interval between graduations."[1.10]

interval, graduated. – See "graduated interval."[1.10]

irregularly-shaped object. – Any object that is not a hexahedron shape.[5.58]
(Added 2008)

J

jewelers' scale. – One adapted to weighing gems and precious metals.[2.20]

K

kind of grain. – Corn as distinguished from soybeans as distinguished from wheat, etc.[5.56(a), 5.56(b)]

L

label. – A printed ticket, to be attached to a package, produced by a printer that is a part of a prepackaging scale or that is an auxiliary device.[2.20]

large-delivery device. – Devices used primarily for single deliveries greater than 200 gallons, 2000 pounds, 20 000 cubic feet, 2000 liters, or 2000 kilograms.[3.34, 3.38]

laundry-drier timer. – A timer used in conjunction with a coin-operated device to measure the period of time that a laundry drier is in operation.[5.55]

liquefied petroleum gas. – A petroleum product composed predominantly of any of the following hydrocarbons or mixtures thereof: propane, propylene, butanes (normal butane or isobutane), and butylenes.[3.31, 3.32, 3.33, 3.34, 3.37]

liquefied petroleum gas liquid-measuring device. – A system including a mechanism or machine of the meter type designed to measure and deliver liquefied petroleum gas in the liquid state by a definite quantity, whether installed in a permanent location or mounted on a vehicle. Means may or may not be provided to indicate automatically, for one of a series of unit prices, the total money value of the liquid measured.[3.33]
(Amended 1987)

liquefied petroleum gas vapor-measuring device. – A system including a mechanism or device of the meter type, equipped with a totalizing index, designed to measure and deliver liquefied petroleum gas in the vapor state by

definite volumes, and generally installed in a permanent location. The meters are similar in construction and operation to the conventional natural- and manufactured-gas meters.[3.33]

liquid fuel. – Any liquid used for fuel purposes, that is, as a fuel, including motor-fuel.[3.30, 3.31]

liquid volume correction factor. – A correction factor used to adjust the liquid volume of a cryogenic product at the time of measurement to the liquid volume at NBP.[3.34]

liquid-fuel device. – A device designed for the measurement and delivery of liquid fuels.[3.30]

liquid-measuring device. – A mechanism or machine designed to measure and deliver liquid by definite volume. Means may or may not be provided to indicate automatically, for one of a series of unit prices, the total money value of the liquid measured, or to make deliveries corresponding to specific money values at a definite unit price.[3.30]

livestock scale. – A scale equipped with stock racks and gates and adapted to weighing livestock standing on the scale platform.[2.20]
(Amended 1989)

load cell. – A device, whether electric, hydraulic, or pneumatic, that produces a signal (change in output) proportional to the load applied.[2.20, 2.21, 2.23]

load cell verification interval (v). – The load cell interval, expressed in units of mass, used in the test of the load cell for accuracy classification.[2.20, 2.21]
(Added 1996)

loading point. – The location at which material to be conveyed is applied to the conveyor.[2.21]

load-receiving element. – That element of a scale that is designed to receive the load to be weighed; for example, platform, deck, rail, hopper, platter, plate, scoop.[2.20, 2.21, 2.23]

low-flame test. – A test simulating extremely low-flow rates such as caused by pilot lights.[3.33]

lubricant device. – A device designed for the measurement and delivery of liquid lubricants, including, but not limited to, heavy gear lubricants and automatic transmission fluids (automotive).[3.30]

M

m^3/h. – Cubic meters per hour.[3.33]

main bar. – A principal weighbeam bar, usually of relatively large capacity as compared with other bars of the same weighbeam. (On an automatic-indicating scale equipped with a weighbeam, the main weighbeam bar is frequently called the "capacity bar.")[2.20]

main graduation. – A graduation defining the primary or principal subdivisions of a graduated series. (Also see "graduation.")[1.10]

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

manual zero-setting mechanism. – See "manual zero-setting mechanism" under "zero-setting mechanism."[2.20]

manufactured device. – Any commercial weighing or measuring device shipped as new from the original equipment manufacturer.[1.10]
(Amended 2001)

mass flow meter. – A device that measures the mass of a product flowing through the system. The mass measurement may be determined directly from the effects of mass on the sensing unit or may be inferred by

measuring the properties of the product, such as the volume, density, temperature, or pressure, and displaying the quantity in mass units.[3.37]

master meter test method. – A method of testing milk tanks that utilizes an approved master meter system for measuring test liquid removed from or introduced into the tank.[4.42]

master weight totalizer. – An indicating element used with a belt-conveyor scale to indicate the weight of material that was passed over the scale. The master weight totalizer is a primary indicating element of the belt-conveyor scale.[2.21]

material test. – The test of a belt-conveyor scale using material (preferably that for which the device is normally used) that has been weighed to an accuracy of 0.1 %.[2.21]

(Amended 1989)

maximum capacity. – The largest load that may be accurately weighed.[2.20, 2.24]

(Added 1999)

maximum cargo load. – The maximum cargo load for trucks is the difference between the manufacturer's rated gross vehicle weight and the actual weight of the vehicle having no cargo load.[5.53]

measurement field. – A region of space or the measurement pattern produced by the measuring instrument in which objects are placed or passed through, either singly or in groups, when being measured by a single device.[5.58]

measuring element. – That portion of a complete multiple dimension measuring device that does not include the indicating element.[5.58]

meter register. – An observation index for the cumulative reading of the gas flow through the meter. In addition there are one or two proving circles in which one revolution of the test hand represents ½, 1, 2, 5, or 10 cubic feet, or 0.025, 0.05, 0.1, 0.2, or 0.25 cubic meter, depending on meter size. If two proving circles are present, the circle representing the smallest volume per revolution is referred to as the "leak-test circle."[3.33]

metrological integrity (of a device). – The design, features, operation, installation, or use of a device that facilitates (1) the accuracy and validity of a measurement or transaction, (2) compliance of the device with weights and measures requirements, or (3) the suitability of the device for a given application.[1.10, 2.20]

(Added 1993)

minimum capacity. – The smallest load that may be accurately weighed. The weighing results may be subject to excessive error if used below this value.[2.20, 2.24]

(Added 1999)

minimum clear interval. – The shortest distance between adjacent graduations when the graduations are not parallel. (Also see "clear interval.")[3.30, 3.31, 3.32, 3.33, 3.34, 3.35, 3.36, 3.38, 5.50, 5.51, 5.56(b)]

minimum delivery. – The least amount of weight that is to be delivered as a single weighment by a belt-conveyor scale system in normal use.[2.21]

minimum tolerance. – Minimum tolerances are the smallest tolerance values that can be applied to a scale. Minimum tolerances are determined on the basis of the value of the minimum graduated interval or the nominal or reading face capacity of the scale. (See also definition for basic tolerances.)[2.20, 2.22, 2.24]

minimum totalized load. – The least amount of weight for which the scale is considered to be performing accurately.[2.21]

mobile data terminal (MDT). – a computerized device which may include a digital video display, audio capabilities, and keypad or touch screen input that can be interfaced with a taximeter to operate as part of a point of sale system.

moisture content (wet basis). – The mass of water in a grain or seed sample (determined by the reference method) divided by the mass of the grain or seed sample expressed as a percentage (%).[5.56(a), 5.56(b)]

money drop. – An increment of fare indication. The "initial money drop" is the first increment of fare indication following activation of the taximeter.[5.54]

money-operated type. – A device designed to be released for service by the insertion of money, or to be actuated by the insertion of money to make deliveries of product.[1.10]

motor-fuel. – Liquid used as fuel for internal-combustion engines.[3.30]

motor-fuel device or motor-fuel dispenser or retail motor-fuel device. – A device designed for the measurement and delivery of liquids used as fuel for internal-combustion engines. The term "motor-fuel dispenser" means the same as "motor-fuel device"; the term "retail motor-fuel device" applies to a unique category of device (see definition of "retail device").[3.30, 3.32, 3.37]

multi-class. – A description of a grouping of grain classes, from the same grain type, in one calibration. A multi-class grain calibration may include (1) all the classes of a grain type (all-class calibration), or (2) some of the classes of a grain type within the calibration.[5.56(a), 5.57.]
(Added 2007)

multi-interval scale. – A scale having one weighing range which is divided into partial weighing ranges (segments), each with different scale intervals, with each partial weighing range (segment) determined automatically according to the load applied, both on increasing and decreasing loads.[2.20]
(Added 1995)

multi-jet water meter. – A water meter in which the moving element takes the form of a multiblade rotor mounted on a vertical spindle within a cylindrical measuring chamber. The liquid enters the measuring chamber through several tangential orifices around the circumference and leaves the measuring chamber through another set of tangential orifices placed at a different level in the measuring chamber. These meters register by recording the revolutions of a rotor set in motion by the force of flowing water striking the blades.[3.36]
(Added 2003)

multi-revolution scale. – An automatic-indicating scale having a nominal capacity that is a multiple of the reading-face capacity and that is achieved by more than one complete revolution of the indicator.[2.20]

multiple. – An integral multiple; that is, a result obtained by multiplying by a whole number. (Also see "multiple of a scale.")[1.10]

multiple cell application load cell. – A load cell intended for use in a weighing system which incorporates more than one load cell. A multiple cell application load cell is designated with the letter "M" or the term "Multiple." (See also "single cell application load cell")[2.20]
(Added 1999)

multiple of a scale. – In general, the multiplying power of the entire system of levers or other basic weighing elements. (On a beam scale, the multiple of the scale is the number of pounds on the load-receiving element that will be counterpoised by 1 pound applied to the tip pivot of the weighbeam.)[2.20]

multiple range scale. – A scale having two or more weighing ranges with different maximum capacities and different scale intervals for the same load receptor, each range extending from zero to its maximum capacity.[2.20]
(Added 1995)

multiple-tariff taximeter. – One that may be set to calculate fares at any one of two or more rates.[5.54]

N

natural gas. – A gaseous fuel, composed primarily of methane, that is suitable for compression and dispensing into a fuel storage container(s) for use as an engine fuel.[3.37]
(Added 1994)

NBP. – Normal Boiling Point of a cryogenic liquid at 14.696 lb/in^2 absolute.[3.34]

negotiated flat rate. - A fixed fare that is not predetermined and is based on a destination point that is agreed upon by both driver and passenger which is then entered into the taximeter by the taxi driver. [5.54]

n_{max} (maximum number of scale divisions). – The maximum number of scale divisions for which a main element or load cell complies with the applicable requirements. The maximum number of scale divisions permitted for an installation is limited to the lowest n_{max} marked on the scale indicating element, weighing element, or load cell.[2.20, 2.21, 2.24]
(Added 1997)

no-load reference value. – A positive weight value indication with no load in the load-receiving element (hopper) of the scale. (Used with automatic bulk-weighing systems and certain single-draft, manually-operated receiving hopper scales installed below grade and used to receive grain.)[2.20]

nominal. – Refers to "intended" or "named" or "stated," as opposed to "actual." For example, the "nominal" value of something is the value that it is supposed or intended to have, the value that it is claimed or stated to have, or the value by which it is commonly known. Thus, "1-pound weight," "1-gallon measure," "1-yard indication," and "500-pound scale" are statements of nominal values; corresponding actual values may be greater or lesser. (See nominal capacity of a scale) [1.10]

nominal capacity. – The nominal capacity of a scale is (a) the largest weight indication that can be obtained by the use of all of the reading or recording elements in combination, including the amount represented by any removable weights furnished or ordinarily furnished with the scale, but excluding the amount represented by any extra removable weights not ordinarily furnished with the scale, and excluding also the capacity of any auxiliary weighing attachment not contemplated by the original design of the scale, and excluding any fractional bar with a capacity less than 2½ % of the sum of the capacities of the remaining reading elements, or (b) the capacity marked on the scale by the manufacturer, whichever is less. (Also see "nominal capacity, batching scale"; "nominal capacity, hopper scale.")[2.20]

nominal capacity, batching scale. – The nominal capacity of a batching scale is the capacity as marked on the scale by the scale manufacturer, or the sum of the products of the volume of each of the individual hoppers, in terms of cubic feet, times the weight per cubic foot of the heaviest material weighed in each hopper, whichever is less.[2.20]

nominal capacity, hopper scale. – The nominal capacity of a hopper scale is the capacity as marked on the scale by the scale manufacturer, or the product of the volume of the hopper in bushels or cubic feet times the maximum weight per bushel or cubic foot, as the case may be, of the commodity normally weighed, whichever is less.[2.20]

non-automatic checkweigher. – A weighing instrument that requires the intervention of an operator during the weighing process, used to subdivide items of different weights into one or more subgroups, such as identifying packages that have acceptable or unacceptable fill levels according to the value of the difference between their weight and a pre-determined set point.[2.24]

Notes: Determining the weighing result includes any intelligent action of the operator that affects the result, such as deciding and taking an action when an indication is stable or adjusting the weight of the weighed load.

Deciding the weighing result is acceptable means making a decision regarding the acceptance of each weighing result on observing the indication or releasing a print-out. The weighing process allows the operator to take an action which influences the weighing result in the case where the weighing result is not acceptable.

(Added 2004)

non-automatic weighing instrument. – A weighing instrument or system that requires the intervention of an operator during the weighing process to determine the weighing result or to decide that it is acceptable.[2.20, 2.24]

Notes: Determining the weighing result includes any intelligent action of the operator that affects the result, such as deciding and taking an action when an indication is stable or adjusting the weight of the weighed load.

Deciding the weighing result is acceptable means making a decision regarding the acceptance of each weighing result on observing the indication or releasing a print-out. The weighing process allows the operator to take an action which influences the weighing result in the case where the weighing result is not acceptable.

(Added 2004) (Amended 2005)

nonretroactive. – "Nonretroactive" requirements are enforceable after the effective date for:

1. devices manufactured within a state after the effective date;

2. both new and used devices brought into a state after the effective date; and

3. devices used in noncommercial applications which are placed into commercial use after the effective date.

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.)*[1.10]

(Amended 1989)

nose-iron. – A slide-mounted, manually-adjustable pivot assembly for changing the multiple of a lever.[2.20]

notes. – A section included in each of a number of codes, containing instructions, pertinent directives, and other specific information pertaining to the testing of devices. Notes are primarily directed to weights and measures officials.

NTP. – Normal Temperature and Pressure of a cryogen at a temperature of 21 °C (70 °F) and a pressure of 101.325 kPa (14.696 lb/in^2 absolute).[3.34]

NTP density and volume correction factor. – A correction factor used to adjust the liquid volume of a cryogenic product at the time of measurement to the gas equivalent at NTP.[3.34]

O

odometer. – A device that automatically indicates the total distance traveled by a vehicle. For the purpose of this code, this definition includes hub odometers, cable-driven odometers, and the distance-indicating or odometer portions of "speedometer" assemblies for automotive vehicles.[5.53]

official grain samples. – Grain or seed used by the official as the official transfer standard from the reference standard method to test the accuracy and precision of grain moisture meters.[5.56(a), 5.56(b)]

official with statutory authority. – The representative of the jurisdiction(s) responsible for certifying the accuracy of the device.[2.20, 2.21, 2.22]

(Added 1991)

operating tire pressure. – The pressure in a tire immediately after a vehicle has been driven for at least 5 miles or 8 kilometers.[5.53, 5.54]

over-and-under indicator. – An automatic-indicating element incorporated in or attached to a scale and comprising an indicator and a graduated scale with a central or intermediate "zero" graduation and a limited range of weight graduations on either side of the zero graduation, for indicating weights greater than and less than the predetermined values for which other elements of the scale may be set. (A scale having an over-and-under indicator is classed as an automatic-indicating scale.)[2.20]

overregistration and underregistration. – When an instrument or device is of such a character that it indicates or records values as a result of its operation, its error is said to be in the direction of overregistration or underregistration, depending upon whether the indications are, respectively, greater or less than they should be. Examples of devices having errors of "overregistration" are: a fabric-measuring device that indicates more than the true length of material passed through it; and a liquid-measuring device that indicates more than the true amount of the liquid delivered by the device. Examples of devices having errors of "underregistration" are: a meter that indicates less than the true amount of product that it delivers; and a weighing scale that indicates or records less than the true weight of the applied load.[1.10]

P

parallax. – The apparent displacement, or apparent difference in height or width, of a graduation or other object with respect to a fixed reference, as viewed from different points.[1.10]

parking meter. – A coin-operated device for measuring parking time for vehicles.[5.55]

passenger vehicles. – Vehicles such as automobiles, recreational vehicles, limousines, ambulances, and hearses. [5.53]

performance requirements. – Performance requirements include all tolerance requirements and, in the case of nonautomatic-indicating scales, sensitivity requirements (SR). (See definitions for "tolerance" and "sensitivity requirement.")[1.10]

point-of-sale system. – An assembly of elements including a weighing or measuring element, an indicating element, and a recording element (and may also be equipped with a "scanner") used to complete a direct sales transaction. [2.20, 3.30, 3.32, 3.37, **5.54]**

(Added 1986) (Amended 1997)

poise. – A movable weight mounted upon or suspended from a weighbeam bar and used in combination with graduations, and frequently with notches, on the bar to indicate weight values. (A suspended poise is commonly called a "hanging poise.")[2.20]

postal scale. – A scale (usually a computing scale) designed for use to determine shipping weight or delivery charges for letters or parcels delivered by the U. S. Postal Service or private shipping companies. A weight classifier may be used as a postal scale.[2.20]

(Added 1987)

prepackaging scale. – A computing scale specially designed for putting up packages of random weights in advance of sale.[2.20]

prescription scale. – A scale or balance adapted to weighing the ingredients of medicinal and other formulas prescribed by physicians and others and used or intended to be used in the ordinary trade of pharmacists.[2.20]

pressure type (device). – A type of device designed for operation with the liquid under artificially produced pressure.[3.30, 3.31]

primary indicating or recording elements. – The term "primary" is applied to those principal indicating (visual) elements and recording elements that are designed to, or may, be used by the operator in the normal commercial use of a device. The term "primary" is applied to any element or elements that may be the determining factor in arriving at the sale representation when the device is used commercially. (Examples of primary elements are the visual indicators for meters or scales not equipped with ticket printers or other recording elements and both the visual indicators and the ticket printers or other recording elements for meters or scales so equipped.) The term "primary" is not applied to such auxiliary elements as, for example, the totalizing register or predetermined-stop mechanism on a meter or the means for producing a running record of successive weighing operations, these elements being supplementary to those that are the determining factors in sales representations of individual deliveries or weights. (See "indicating element" and "recording element.")[1.10]

prover method. – A method of testing milk tanks that utilizes approved volumetric prover(s) for measuring the test liquid removed from or introduced into the tank.[4.42]

prover oil. – A light oil of low vapor pressure used as a sealing medium in bell provers, cubic-foot bottles, and portable cubic-foot standards.[3.33]

proving indicator. – The test hand or pointer of the proving or leak-test circle on the meter register or index.[3.33, 3.36.]

R

"r" factor. – A computation for determining the suitability of a vehicle scale for weighing vehicles with varying axle configurations. The factor was derived by dividing the weights in FHWA Federal Highway Bridge Gross Weight Table B by 34 000 lbs. (The resultant factors are contained in Table UR.3.2.1.)[2.20]

radio frequency interference (RFI). – Radio frequency interference is a type of electrical disturbance that, when introduced into electronic and electrical circuits, may cause deviations from the normally expected performance. [1.10]

random error(s). – The sample standard deviation of the error (indicated values) for a number of consecutive automatic weighings of a load, or loads, passed over the load receptor, shall be expressed mathematically as:

$$s = \sqrt{\frac{1}{n-1}\sum\left(X_i - \bar{X}\right)^2} \quad \text{or} \quad s = \sqrt{\frac{1}{n-1}\left(\sum X_i^2 - \frac{\left(\sum X_i\right)^2}{n}\right)}$$

where: x = error of a load indication
n = the number of loads

[2.24]

ranges, weight. – See "weight ranges."[2.20]

rated capacity. – The rate of flow in cubic meters per hour of a hydrocarbon gas vapor-measuring device as recommended by the manufacturer. This rate of flow should cause a pressure drop across the meter not exceeding ½-inch water column.[3.33]

rated scale capacity. – That value representing the weight that can be delivered by the device in one hour.[2.21]

ratio test. – A test to determine the accuracy with which the actual multiple of a scale agrees with its designed multiple. This test is used for scales employing counterpoise weights and is made with standard test weights substituted in all cases for the weights commercially used on the scale. (It is appropriate to use this test for some scales not employing counterpoise weights.)[2.20]

reading face. – That portion of an automatic-indicating weighing or measuring device that gives a visible indication of the quantity weighed or measured. A reading face may include an indicator and a series of graduations or may present values digitally, and may also provide money-value indications.[1.10, 2.20]

(Amended 2005)

reading-face capacity. – The largest value that may be indicated on the reading face, exclusive of the application or addition of any supplemental or accessory elements.[1.10]

recorded representation. – The printed, embossed, or other representation that is recorded as a quantity by a weighing or measuring device.[1.10]

recording element. – An element incorporated in a weighing or measuring device by means of which its performance relative to quantity or money value is permanently recorded on a tape, ticket, card, or the like, in the form of a printed, stamped, punched, or perforated representation.[1.10, 2.21]

recording scale. – One on which the weights of applied loads may be permanently recorded on a tape, ticket, card, or the like in the form of a printed, stamped, punched, or perforated representation.[2.20]

reference weight car. – A railroad car weighed on a scale for temporary use as a mass standard over a short period of time (typically, the time required to test one scale) as part of a test train.

Note: A test weight car that is representative of the types of cars typically weighed on the scale under test may be used wherever reference weight cars are specified.[2.20]

(Added 1991)

remanufactured device. – A device that is disassembled, checked for wear, parts replaced or fixed, reassembled and made to operate like a new device of the same type.[1.10]

(Added 2001)

remanufactured element. – An element that is disassembled, checked for wear, parts replaced or fixed, reassembled and made to operate like a new element of the same type.[1.10]

(Added 2001)

remote configuration capability. – The ability to adjust a weighing or measuring device or change its sealable parameters from or through some other device that is not itself necessary to the operation of the weighing or measuring device or is not a permanent part of that device.[2.20, 2.21, 2.24, 3.30, 3.37, **5.54.** 5.56(a)]

(Added 1993)

repaired device. – A device to which work is performed that brings the device back into proper operating condition. [1.10]

(Added 2001)

repaired element. – An element to which work is performed that brings the element back into proper operating condition.[1.10]

(Added 2001)

retail device. – A measuring device primarily used to measure product for the purpose of sale to the end user.[3.30, 3.32, 3.37]

(Amended 1987 and 2004)

retroactive. – "Retroactive" requirements are enforceable with respect to all equipment. Retroactive requirements are printed herein in upright roman type. (Also see "nonretroactive.")[1.10]

road test. – A distance test, over a measured course, of a complete taximeter assembly when installed on a vehicle, the mechanism being actuated as a result of vehicle travel.[5.53, 5.54]

rolling circumference. – The rolling circumference is the straight line distance traveled per revolution of the wheel (or wheels) that actuates the taximeter or odometer. If more than one wheel actuates the taximeter or odometer, the rolling circumference is the average distance traveled per revolution of the actuating wheels.[5.53, 5.54]

S

scale. – See specific type of scale.[2.20]

scale area, belt-conveyor. – See belt-conveyor scale systems area.[2.21]
(Added 2001)

scale division, number of (n). – Quotient of the capacity divided by the value of the verification scale division. [2.20]

$$n = \frac{Capacity}{e}$$

scale division, value of (d). – The value of the scale division, expressed in units of mass, is the smallest subdivision of the scale for analog indication or the difference between two consecutively indicated or printed values for digital indication or printing. (Also see "verification scale division.")[2.20, 2.22]

scale section. – A part of a vehicle, axle-load, livestock, or railway track scale consisting of two main load supports, usually transverse to the direction in which the load is applied.[2.20]

seal. – See "approval seal," "security seal."[1.10]

section capacity. – The section capacity of a scale is the maximum live load that may be divided equally on the load pivots or load cells of a section.[2.20]
(Added 2001)

section test. – A shift test in which the test load is applied over individual sections of the scale. This test is conducted to disclose the weighing performance of individual sections, since scale capacity test loads are not always available and loads weighed are not always distributed evenly over all main load supports.[2.20]

security means. – A method used to prevent access by other than qualified personnel, or to indicate that access has been made to certain parts of a scale that affect the performance of the device.[2.21]

security seal. – A uniquely identifiable physical seal, such as a lead-and-wire seal or other type of locking seal, a pressure-sensitive seal sufficiently permanent to reveal its removal, or similar apparatus attached to a weighing or measuring device for protection against or indication of access to adjustment. (Also see "approval seal.")[1.10]
(Amended 1994)

selector-type. – A system of indication or recording in which the mechanism selects, by means of a ratchet-and-pawl combination or by other means, one or the other of any two successive values that can be indicated or recorded.[1.10]

semi-automatic zero-setting mechanism. – See "semi-automatic zero-setting mechanism" under "zero-setting mechanism."[2.20]

sensitivity (of a nonautomatic-indicating scale). – The value of the test load on the load-receiving element of the scale that will produce a specified minimum change in the position of rest of the indicating element or elements of the scale.[2.20]

sensitivity requirement (SR). – A performance requirement for a non automatic-indicating scale; specifically, the minimum change in the position of rest of the indicating element or elements of the scale in response to the increase or decrease, by a specified amount, of the test load on the load-receiving element of the scale.[2.20]

shift test. – A test intended to disclose the weighing performance of a scale under off-center loading.[2.20]

side. – That portion of a pump or dispenser which faces the consumer during the normal delivery of product.[3.30]
(Added 1987)

simulated-road test. – A distance test during which the taximeter or odometer may be actuated by some means other than road travel. The distance traveled is either measured by a properly calibrated roller device or computed from rolling circumference and wheel-turn data.[5.53, 5.54]

simulated test. – A test using artificial means of loading the scale to determine the performance of a belt-conveyor scale.[2.21]

single cell application load cell. – A load cell intended for use in a weighing system which incorporates one or more load cells. A single cell application load cell is designated with the letter "S" or the term "Single." (See also "multiple cell application load cell")[2.20]
(Added 1999)

single-tariff taximeter. – One that calculates fares at a single rate only.[5.54]

skirting. – Stationary side boards or sections of belt conveyor attached to the conveyor support frame or other stationary support to prevent the bulk material from falling off the side of the belt.[2.21]

slow-flow meter. – A retail device designed for the measurement, at very slow rates (less than 40 L (10 gal) per hour), of liquid fuels at individual domestic installations.[3.30]

small-delivery device. – Any device other than a large-delivery device.[3.34, 3.38]

span (structural). The distance between adjoining sections of a scale.[2.20]
(Added 1988)

specification. – A requirement usually dealing with the design, construction, or marking of a weighing or measuring device. Specifications are directed primarily to the manufacturers of devices.[1.10]

static monorail weighing system. – A weighing system in which the load being applied is stationary during the weighing operation.[2.20]
(Added 1999)

strain-load test. – The test of a scale beginning with the scale under load and applying known test weights to determine accuracy over a portion of the weighing range. The scale errors for a strain-load test are the errors observed for the known test loads only. The tolerances to be applied are based on the known test load used for each error that is determined.[2.20, 2.22]

subordinate graduation. – Any graduation other than a main graduation. (Also see "graduation.")[1.10]

subsequent distance or time intervals. – The intervals corresponding to money drops following the initial money drop.[5.54]

substitution test. – A scale testing process used to quantify the weight of material or objects for use as a known test load. [2.20]

(Added 2003)

substitution test load. – 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.[2.20]

(Added 2003)

surface gauge. – A combination of (1) a stationary indicator, and (2) a movable, graduated element designed to be brought into contact with the surface of the liquid from above.[4.42]

systematic (average) error ($\overline{X}$) **. –** The mean value of the error (of indication) for a number of consecutive automatic weighings of a load, or loads, passed over the load-receiving element (e.g., weigh-table), shall be expressed mathematically as:

$$\overline{X} = \frac{\sum X}{n}$$

where: x = error of a load indication
n = the number of loads

[2.24]

T

tail pulley. – The pulley at the opposite end of the conveyor from the head pulley.[2.21]

take-up. – A device to provide sufficient tension in a conveyor belt so that the belt will be positively driven by the drive pulley. – A counter-weighted take-up consists of a pulley free to move in either the vertical or horizontal direction with dead weights applied to the pulley shaft to provide the tension required.[2.21]

tare mechanism. – A mechanism (including a tare bar) designed for determining or balancing out the weight of packaging material, containers, vehicles, or other materials that are not intended to be included in net weight determinations.[2.20]

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]

weighing element. – That portion of a scale that supports the load-receiving element and transmits to the indicating element a signal or force resulting from the load applied to the load-receiving element.[2.20, 2.21, 2.22]
(Added 1988)

weigh-labeler. – An automatic weighing system that determines the weight of a package and prints a label or other document bearing a weight declaration for each discrete item (usually a label also includes unit and total price declarations). Weigh-labelers are sometimes used to weigh and label standard and random packages (also called "Prepackaging Scales").[2.24]
(Amended 2004)

weighment. – A single complete weighing operation.[2.20, 2.21]
(Added 1986)

weight, unit. – See "unit weight."[2.20]

weight classifier. – A digital scale that rounds weight values up to the next scale division. These scales usually have a verification scale division (e) that is smaller than the displayed scale division.[2.20]
(Added 1987)

weight ranges. – Electrical or electro-mechanical elements incorporated in an automatic indicating scale through the application of which the range of automatic indication of the scale is increased, normally in increments equal to the reading-face capacity.[2.20]

wet basis. – See "moisture content (wet basis)."[5.56(a), 5.56(b)]

wet hose. – A discharge hose intended to be full of product at all times. (See "wet-hose type.")[3.30, 3.31, 3.38]
(Amended 2002)

wet-hose type. – A type of device designed to be operated with the discharge hose full of product at all times. (See "wet hose.")[3.30, 3.32, 3.34, 3.37, 3.38]
(Amended 2002)

wheel-load weighers. – Compact, self-contained, portable weighing elements specially adapted to determining the wheel loads or axle loads of vehicles on highways for the enforcement of highway weight laws only.[2.20]

wholesale device. – Any device other than a retail device. (See "retail device.")[3.30, 3.32]

wing pulley. – A pulley made of widely spaced metal bars in order to set up a vibration to shake loose material off the underside (return side) of the belt.[2.21]

Z

zero-load balance. – A correct weight indication or representation of zero when there is no load on the load-receiving element. (See also "zero-load balance for an automatic-indicating scale," "zero-load balance for a nonautomatic-indicating scale," "zero-load balance for a recording scale.")[2.20]

zero-load balance, automatic-indicating scale. – A condition in which the indicator is at rest at, or oscillates through approximately equal arcs on either side of, the zero graduation.[2.20]

zero-load balance, nonautomatic-indicating scale. – A condition in which (a) the weighbeam is at rest at, or oscillates through approximately equal arcs above and below, the center of a trig loop; (b) the weighbeam or lever system is at rest at, or oscillates through approximately equal arcs above and below, a horizontal position or a position midway between limiting stops; or (c) the indicator of a balance indicator is at rest at, or oscillates through approximately equal arcs on either side of, the zero graduation.[2.20]

zero-load balance for a recording scale. – A condition in which the scale will record a representation of zero load. [2.20]

zero-load reference (belt-conveyor scales). – A zero-load reference value represents no load on a moving conveyor belt. This value can be either; a number representing the electronic load cell output, a percentage of full scale capacity, or other reference value that accurately represents the no load condition of a moving conveyor belt. The no load reference value can only be updated after the completion of a zero load test.[2.21]

(Added 2002)

zero-setting mechanism. – Means provided to attain a zero balance indication with no load on the load-receiving element. The types of zero-setting mechanisms are:[2.20, 2.22, 2.24]

automatic zero-setting mechanism (AZSM). – Automatic means provided to set the zero-balance indication without the intervention of an operator.[2.22]

(Added 2010)

automatic zero-tracking (AZT) mechanism. – See "automatic zero-tracking (AZT) mechanism." (NOTE: AZT maintains zero with specified limits. "Zero-setting sets/establishes zero with limits based on scale capacity.)[2.20, 2.22, 2.24]

initial zero-setting mechanism. – Automatic means provided to set the indication to zero at the time the instrument is switched on and before it is ready for use.[2.20]

(Added 1990)

manual zero-setting mechanism. – Nonautomatic means provided to attain a zero balance indication by the direct operation of a control.[2.20]

semiautomatic zero-setting mechanism. – Automatic means provided to attain a direct zero balance indication requiring a single initiation by an operator.[2.20]

(Amended 2010)

zero-setting mechanism (belt-conveyor scale). – A mechanism enabling zero totalization to be obtained over a whole number of belt revolutions.[2.21, 2.23]

(Added 2002)

zero-tracking mechanism. – See "automatic zero-tracking mechanism" under "zero-setting mechanism."[2.20, 2.22, 2.24]

zone of uncertainty. – The zone between adjacent increments on a digital device in which the value of either of the adjacent increments may be displayed.[2.20]