

Developing Proposal to change NIST Handbook 44 To Address Hydrogen Refueling Applications

Currently, the U.S. National Work Group (USNWG) for the Development of Commercial Hydrogen Measurement Standards is working to fully develop a new Hydrogen Gas-Measuring Devices Code and add new and modify existing definitions in Appendix D of NIST Handbook 44 (H44). The draft code and definitions address legal metrology requirements for the newly emerging hydrogen refueling technology. The USNWG believes the code has merit and wants to provide the weights and measures community with this information since 18 states now have hydrogen refueling stations in operation. The weights and measures community must have time to consider requirements for hydrogen-refueling dispensers before this application is available for public access at corner service stations.

The USNWG began work on this project in October 2007, although a draft code was first distributed to the community in February 2005. Draft 3.2 of the H44 Code shown below is the result of work by the USNWG Device Standards Subcommittee (DSS) at its August 2008 meeting. Draft 3.2 was further reviewed and revised by the DSS at its December 2008 meeting. The DSS plans to have Draft 3.3 available for distribution in January 2009. The USNWG is also submitting a corresponding proposal to the National Conference on Weights and Measures Laws and Regulations Committee that addresses method of sale and engine fuel quality requirements for hydrogen in NIST Handbook 130.

More information on the work by the USNWG is available on the NIST WMD web site at <http://ts.nist.gov/WeightsAndMeasures/index.cfm>, under the W&M Resources link to “Developing Commercial Hydrogen Measurement Standards.” To comment on this proposal, contact Juana Williams, NIST WMD, at juana.williams@nist.gov, by telephone at (301) 975-3989, by fax at (301) 975-8091 or by postal mail at NIST WMD, 100 Bureau Drive, MS 2600, Gaithersburg, MD 20899-2600.

Recommendation: Add a Developing Item to the National Conference on Weights and Measures Specifications and Tolerances Committee Agenda proposing a new Hydrogen Gas Measuring Devices Code and modifications to relevant Appendix D Definitions in NIST Handbook 44 to address gaseous hydrogen refueling applications as follows:

Sec. 3.3X. Hydrogen Gas-Measuring Devices

A.1. This code applies to devices that are designed to dynamically measure the mass of hydrogen gas in the vapor state used as a vehicle fuel.

A.2. This code does not apply to devices used solely for dispensing a product in connection with operations in which the amount dispensed does not affect customer charges.

A.3. Type Evaluation. - The National Type Evaluation Program will accept for type evaluation only those devices that comply with all requirements of this code.

A.4. In addition to the requirements of this code, hydrogen gas meters shall meet the requirements of Section 1.10 General Code.

S. Specifications

S.1. Indicating and Recording Elements.

S.1.1. Indicating Elements. – A measuring assembly shall include an indicating element that continuously displays measurement results relative to quantity and total price. Indications shall be clear, definite, accurate, and easily read under normal conditions of operation of the instrument.

S.1.2. Vehicle Dispensers. – A hydrogen gas dispenser used to fuel vehicles shall be of the computing type and shall indicate the mass, the unit price, and the total price of each delivery.

S.1.3. Units. -

S.1.3.1. Units of Measurement. - Deliveries shall be indicated and recorded in kilograms and decimal subdivisions thereof.

S.1.3.2. Numerical Value of Quantity-Value Divisions. - The value of a scale interval shall be equal to:

- 1, 2, or 5, or

- a decimal multiple or submultiple of 1, 2, or 5.

Examples: quantity-value divisions may be 10, 20, 50, 100; or 0.01, 0.02, 0.05; or 0.1, 0.2, or 0.5 etc.

S.1.3.3. Maximum Value of Quantity-Value Divisions. - The maximum value of the quantity-value division shall be not greater than 1.0 % of the minimum measured quantity.

S.1.3.4. Values Defined. - Indicated values shall be adequately defined by a sufficient number of figures, words, symbols, or combinations thereof. A display of "zero" shall be a zero digit for all displayed digits to the right of the decimal mark and at least one to the left.

S.2. Operating Requirements.

S.2.1. Return to Zero.

- (a) One indicator and the primary recording elements, if the device is equipped to record, shall be provided with a means for readily returning the indication to zero either automatically or manually.
- (b) It shall not be possible to return primary indicating elements, or primary recording elements, beyond the correct zero position.

S.2.2. Indicator Reset Mechanism. - The reset mechanism for the indicating element shall not be operable during a delivery. Once the zeroing operation has begun, it shall not be possible to indicate a value other than the latest measurement, or "zeros" when the zeroing operation has been completed.

S.2.3. Nonresettable Indicator. - An instrument may also be equipped with a nonresettable indicator if the indicated values cannot be construed to be the indicated values of the resettable indicator for a delivered quantity.

S.2.4. Provisions for Power Loss.

S.2.4.1. Transaction Information. - In the event of a power loss, the information needed to complete any transaction in progress at the time of the power loss (such as the quantity and unit price, or sales price) shall be determinable for at least 15 minutes at the dispenser or at the console if the console is accessible to the customer.

S.2.4.2. User Information. - The device memory shall retain information on the quantity of fuel dispensed and the sales price totals during power loss.

S.2.5. Display of Unit Price and Product Identity.

S.2.5.1. Unit Price. - A computing or money-operated device shall be able to display on each face the unit price at which the device is set to compute or to dispense.

S.2.5.2. Product Identity. - A device shall be able to conspicuously display on each side the identity of the product being dispensed.

S.2.5.3. Selection of Unit Price. - When a product is offered for sale at more than one unit price through a computing device, the selection of the unit price shall be made prior to delivery using controls on the device or other customer-activated controls. A system shall not permit a change to the unit price during delivery of a product.

S.2.5.4. Agreement Between Indications. - All quantity, unit price, and total price indications within a measuring system shall agree for each transaction.

S.2.6. Money-Value Computations. - A computing device shall compute the total sales price at any single-purchase unit price for which the product being measured is offered

for sale at any delivery possible within either the measurement range of the device or the range of the computing elements, whichever is less.

S.2.6.1. Auxiliary Elements. - If a system is equipped with auxiliary indications, all indicated money value and quantity divisions of the auxiliary element shall be identical with those of the primary element.

S.2.6.2. Display of Quantity and Total Price. - When a delivery is completed, the total price and quantity for that transaction shall be displayed on the face of the dispenser for at least 5 minutes or until the next transaction is initiated by using controls on the device or other user-activated controls.

S.2.7. Recorded Representations, Point of Sale Systems. A printed receipt shall be available through a built-in or separate recording element for transactions conducted with point-of-sale systems or devices activated by debit cards, credit cards, and/or cash. The printed receipt shall contain the following information for products delivered by the dispenser:

- (a) the total mass of the delivery,**
- (b) the unit price,**
- (c) the total computed price, and**
- (d) the product identity by name, symbol, abbreviation, or code number.**

S.2.8. Indication of Delivery. - The device shall automatically show on its face the initial zero condition and the quantity delivered (up to the nominal capacity).

S.3. Design of Measuring Elements and Measuring Systems.

S.3.1. Maximum and Minimum Flow-Rates. - The ratio of the maximum to minimum flow-rates specified by the manufacturer for devices measuring gases shall be 10:1 or greater.

S.3.2. Adjustment Means. - An assembly shall be provided with means to change the ratio between the indicated quantity and the quantity of gas measured by the assembly. A bypass on the measuring assembly shall not be used for these means.

S.3.2.1. Discontinuous Adjusting Means. - When the adjusting means changes ratio between the indicated quantity and the quantity of measured gas in a discontinuous manner, the consecutive values of the ratio shall not differ by more than 0.1 %.

S.3.3. Provision for Sealing. - Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that no adjustment may be made of:

- (a) each individual measurement element;
- (b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries
- (c) the zero adjustment mechanism and
- (d) any metrological parameter that detrimentally affects the metrological integrity of the device or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal. Audit trails shall use the format set forth in Table S.3.3.

Table S.3.3. Categories of Device and Methods of Sealing

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

S.3.4. Automatic Density Correction. - An automatic means to determine and correct for changes in product density shall be incorporated in any hydrogen gas metering system where measurements are affected by changes in the density (e.g., the effects of temperature, pressure, or variations in composition due to feedstock, processing, storage, or the environment) of the product being measured.

S.3.5. Pressurizing the Discharge Hose. - The discharge hose for hydrogen gas shall automatically pressurize to a pressure equal to or greater than the receiving vessel prior to the device beginning to register the delivery. Neither initial hose pressurization or purging/bleeding of the discharge hose shall advance the indications.

S.3.6. Zero-Set-Back Interlock, Retail Vehicle Fuel Devices. - A device shall be constructed so that:

- (a) **when the device is shut-off at the end of a delivery an automatic interlock prevents a subsequent delivery until the indicating elements, and recording elements if the device is equipped and activated to record, have been returned to their zero positions;**
- (b) **it shall not be possible to return the discharge nozzle to its start position unless the zero set-back interlock is engaged or becomes engaged and**
- (c) **in a system with more than one dispenser supplied by a single source, an effective automatic control valve in each dispenser prevents product from being delivered until the indicating elements on that dispenser are in a correct zero position.**

S.4. Discharge Lines and Valves.

S.4.1. Diversion of Measured Product. - No means shall be provided by which any measured product can be diverted from the measuring instrument.

S.4.2. Directional Flow Valves. - If a reversal of flow could result in errors that exceed the tolerance for the minimum measured quantity, a valve or valves or other effective means, automatic in operation (and equipped with a pressure limiting device, if necessary) to prevent the reversal of flow shall be properly installed in the system. (See N.1.)

S.4.3. Other Valves. - Check valves and closing mechanisms that are not used to define the measured quantity shall have relief valves (if necessary) to dissipate any abnormally high pressure that may arise in the measuring assembly.

S.5. Markings. - A measuring system shall be conspicuously, legibly, and indelibly marked with the following information:

- (a) **pattern approval mark (i.e., type approval number);**
- (b) **name and address of the manufacturer or his trademark and, if required by the weights and measures authority, the manufacturer's identification mark in addition to the trademark;**

- (c) model designation or product name selected by the manufacturer;
- (d) nonrepetitive serial number;
- (e) the accuracy class of the meter as specified by the manufacturer consistent with Table T.2.;
- (f) maximum and minimum flow rates in kilograms per unit of time;
- (g) maximum working pressure;
- (h) applicable range of ambient temperature if other than -10 °C to +50 °C;
- (i) minimum measured quantity; and
- (j) product limitations, if applicable.

S.6. Printer. – When an assembly is equipped with means for printing the measured quantity, the printed information must agree with the indications on the dispenser for the transaction and the printed values shall be clearly defined.

S.6.1. Printed Receipt. - Any delivered, printed quantity shall include an identification number, the time and date, and the name of the seller. This information may be printed by the device or pre-printed on the ticket.

S.7. Totalizers for Retail Motor-Fuel Devices. - Retail motor-fuel dispensers shall be equipped with a nonresettable totalizer for the quantity delivered through each separate metering device.

N. Notes

N.1. Minimum Measured Quantity. - The minimum measured quantity shall be specified by the manufacturer.

N.2. Test Medium. - The device shall be tested with the product commercially measured except that, in a type evaluation examination, hydrogen gas as defined by(NOT YET PUBLISHED) may be used.

N.3. Test Drafts. - The minimum test shall be one test draft at the declared minimum measured quantity and one test draft at approximately ten times the minimum measured quantity or 1 kg, whichever is greater. More tests may be performed over the range of normal quantities dispensed. (See T.3.)

The test draft shall be made at flows representative of that during normal delivery. The pressure drop between the dispenser and the proving system shall not be greater than that for normal deliveries. The control of the flow (e.g., pipework or valve(s) size, etc.) shall be such that the flow of the meter or measuring system is maintained within the range specified by the manufacturer.

NOTE: Corresponding SAE requirements are under development and this paragraph will be revisited.

N.4. Tests

N.4.1. Master Meter (Transfer) Standard Test. - When comparing a meter with a calibrated transfer standard, the minimum test shall be one test draft at the declared minimum measured quantity and one test draft at approximately ten times the minimum measured quantity or 1 kg, whichever is greater. More tests may be performed over the range of normal quantities dispensed.

N.4.1.1. Verification of Master Metering Systems. – A master metering system used to verify a hydrogen gas-measuring device shall be verified before and after the verification process. A master metering system used to calibrate a hydrogen gas-measuring device, shall be verified before starting the calibration and after the calibration process.

N.4.2. Gravimetric Test. – The weight of the test drafts shall be equal to at least the amount delivered by the device at the declared minimum measured quantity and one test draft at approximately ten times the minimum measured quantity or 1 kg, whichever is greater. More tests may be performed over the range of normal quantities dispensed.

N.4.3. PVT Pressure Volume Temperature Test. – The minimum test with a calibrated volumetric standard shall be one test draft the declared minimum measured quantity and one test draft at approximately ten times the minimum measured quantity or 1 kg, whichever is greater. More tests may be performed over the range of normal quantities dispensed.

N.5. Minimum Measured Quantity. - The device shall be tested for a delivery equal to the declared minimum measured quantity when the device is likely to be used to make deliveries on the order of the declared minimum measured quantity.

N.6. Testing Procedures.

N.6.1. General. - The device or system shall be tested under normal operating conditions of the dispenser.

The test draft shall be made at flows representative of that during normal delivery. The pressure drop between the dispenser and the proving system shall not be greater than that for normal deliveries. The control of the flow (e.g., pipework or valve(s) size, etc.) shall be such that the flow of the meter or measuring system is maintained within the range specified by the manufacturer.

N.6.1.1. Repeatability Tests. - Tests for repeatability should include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors are reduced to minimize the effect on the results obtained.

N.7. Density. - Temperature and pressure of metered hydrogen gas shall be measured during the test for the determination of density or volume correction factors when applicable. For the thermophysical properties of hydrogen the following publications shall apply: for density calculations at temperatures above 220 K and pressures up to 120 MPa, a simple relationship may be used that is given in the publication of Lemmon et al., J. Res. NIST, 2008. Calculations for a wider range of conditions and additional thermophysical properties of hydrogen are available free of charge online at the “NIST Chemistry WebBook” <http://webbook.nist.gov/chemistry>, or available for purchase from NIST as the computer program NIST Standard Reference Database 23 “NIST Reference Fluid Thermodynamic and Transport Properties Database (REFPROP): Version 8.0” <http://www.nist.gov/srd/nist23.htm>. These calculations are based on the reference Leachman, J.W., Jacobsen, R.T, Lemmon, E.W., and Penoncello, S.G. “Fundamental Equations of State for Parahydrogen, Normal Hydrogen, and Orthohydrogen” to be published in the Journal of Physical and Chemical Reference Data. More information maybe obtained from NIST online at <http://www.boulder.nist.gov/div838/Hydrogen/Index.htm>.

T. Tolerances

T.1. Tolerances, General.

- (a) The tolerances apply equally to errors of underregistration and errors of overregistration.
- (b) The tolerances apply to all products at all temperatures measured at any flow rate within the rated measuring range of the meter.

T.2. Tolerances. - The tolerances for hydrogen gas meters are listed in Table T.2.

<u>Table T.2. Accuracy Classes for Hydrogen Gas Meter Applications</u>			
<u>Accuracy Class</u>	<u>Application or Commodity Being Measured</u>	<u>Acceptance Tolerance</u>	<u>Maintenance Tolerance</u>

<u>2.0</u>	<u>Hydrogen gas as a motor fuel</u>	<u>1.5 %</u> <u>(STAY OPEN FOR DISCUSSION)</u>	<u>2.0 %</u>
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T.3. Repeatability. - When multiple tests are conducted at approximately the same flow rate and draft size, the range of the test results for the flow rate shall not exceed 40 % of the absolute value of the maintenance tolerance and the results of each test shall be within the applicable tolerance. See also N.6.1.1.

T.4. Tolerance Application.

T.4.1. Type Evaluation Examinations for Devices. - For type evaluation examinations, the tolerance values shall apply under the following conditions:

- (a) at any temperature and pressure within the operating range of the meter, and**
- (b) for all quantities greater than the minimum measured quantity.**

T.4.2 Transfer Standard Test Method. - To the basic tolerance values that would otherwise be applied, there shall be added an amount equal to two times the standard deviation of the applicable transfer standard when compared to a basic reference standard.

UR. User Requirements

UR.1. Selection Requirements.

UR.1.1. Computing-Type Device. – A hydrogen gas dispenser used to refuel in a commercial sales application shall be of the computing type and shall indicate the mass, the unit price, and the total price of each delivery.

UR.1.2. Discharge Hose-Length. - The length of the discharge hose on a retail motor-fuel device shall not exceed 4.6 m (15 ft) unless it can be demonstrated that a longer hose is essential to permit deliveries to be made to receiving vehicles or vessels.

UR.1.3. Minimum Measured Quantity.

- (a) The minimum measured quantity shall be specified by the manufacturer.**

- (b) The minimum measured quantity appropriate for a transaction may be specified by the weights and measures authority. A device may have a declared minimum measured quantity smaller than that specified by the weights and measures authority; however, the device must perform within the performance requirements for the declared or specified minimum measured quantity up to deliveries at the maximum measurement range.

UR.2. Installation Requirements.

UR.2.1. Manufacturer's Instructions. - A device shall be installed in accordance with the manufacturer's instructions, and the installation shall be sufficiently secure and rigid to maintain this condition.

UR.2.2. Discharge Rate. - A device shall be installed so that after initial equalization the actual maximum discharge rate will not exceed the rated maximum discharge rate. Automatic means of flow regulation shall be incorporated in the installation if necessary.

UR.2.3. Low-Flow Cut-Off Valve. - If a metering system is equipped with a programmable or adjustable "low-flow cut-off" feature:

- (a) the low-flow cut-off value shall not be set at flow rates lower than the minimum operating flow rate specified by the manufacturer on the meter; and
- (b) the system shall be equipped with flow control valves which prevent the flow of product and stop the indicator from registering product flow whenever the product flow rate is less than the low-flow cut-off value.

UR.3. Use of Device.

UR.3.1. Unit Price and Product Identity for Retail Dispensers. - The unit price at which the dispenser is set to compute shall be conspicuously displayed or posted on the face of a retail dispenser used in direct sale.

UR.3.2. Ticket Printer; Customer Ticket. - Vehicle-mounted metering systems shall be equipped with a ticket printer which shall be used for all sales where product is delivered through the meter. A copy of the ticket issued by the device shall be left with the customer at the time of delivery or as otherwise specified by the customer.

UR.3.3. Printed Ticket. - The total price, the total quantity of the delivery, and the price per unit shall be printed on any ticket issued by a device of the computing type and containing any one of these values.

UR.3.4. Ticket in Printing Device. - A ticket shall not be inserted into a device equipped with a ticket printer until immediately before a delivery is begun, and in no case shall a

ticket be in the device when the vehicle is in motion while on a public street, highway, or thoroughfare.

UR.3.5. Steps After Dispensing. - After delivery to a customer from a retail motor-fuel device:

- (a) the device shall be shut-off at the end of a delivery, through an automatic interlock that prevents a subsequent delivery until the indicating elements and recording elements, if the device is equipped and activated to record, have been returned to their zero positions; and
- (b) the discharge nozzle shall not be returned to its start position unless the zero set-back interlock is engaged or becomes engaged by act of returning the discharge nozzle.

UR.3.6. Return of Indicating and Recording Elements to Zero. - The primary indicating elements (visual), and the primary recording elements when these are returnable to zero, shall be returned to zero immediately before each delivery. Exceptions to this requirement are totalizers on key-lock-operated or other self-operated dispensers and the primary recording element if the device is equipped to record.

UR.3.7. Return of Product to Storage, Retail Hydrogen Gas Dispensers. - Provisions at the site shall be made for returning product to storage or disposing of the product in a safe and timely manner during or following testing operations. Such provisions may include return lines, or cylinders adequate in size and number to permit this procedure.

UR.3.8. Conversion Factors. – Established conversion values (see references in N.7) shall be used whenever metered hydrogen gas is billed. All sales shall be based on kilograms.

NOTE: Current NIST Handbook 44 definitions that will need to be modified to correspond with the proposed new code for hydrogen gas meters.

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

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, **3.3X**, 5.56(a)]

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/in² absolute.

Cryogenic liquids, – 21 °C (70 °F) [3.34,]

Hydrocarbon gas vapor – 15 °C (60 °F) [3.33]

Hydrogen gas – 21 °C (70 °F) [3.3X]

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]

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, **3.3X**, 5.56(a)]

D

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, **3.3X**]

discharge line. A rigid pipe connected to the outlet of a measuring device.[3.30, 3.31, 3.32, 3.34, 3.37, **3.3X**]

E

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, 3.3X, 5.54, 5.56(a), 5.56(b), 5.57]

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, 3.3X, 5.54, 5.56(a), 5.56(b), 5.57]

I

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]

M

minimum measured quantity (mmq). The smallest quantity delivered for which the measurement is accurate for that system ... 3.37, 3.3X]

motor-fuel device or motor-fuel dispenser or retail motor-fuel device. A device designed for the measurement and delivery of **liquids products** 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, 3.3X]

N

nonresettable totalizer. An element interfaced with the measuring or weighing element that indicates the cumulative registration of the measured quantity with no means to return to zero.[3.30, 3.37, 3.3X]

P

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, 3.3X]

R

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, 3.3X, 5.56(a)]

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, 3.3X]

W

wet hose. A discharge hose intended to be full of product at all times. (See "wet-hose type.") [3.30, 3.31, 3.38, 3.3X]

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, 3.3X]