Liquified Petroleum Gas 20 Pound Cylinders

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Grilling and cooking, firepits, outdoor heat lamps, indoor heating, water heaters, furnaces, food trucks, RVs, power generators, yard equipment…the list goes on for the many uses of liquified petroleum gas (LPG), commonly called propane. Inspectors who verify the net content of LPG cylinders must have adequate knowledge of the product and take the proper precautions to ensure safety.

OWM is offering a webinar to provide officials with training on LPG. This 5-hour webinar will include a morning and afternoon session, with a 1-hour break in between. Participants will learn about the properties of LPG, where and how it is sold, ways cost and value comparisons (advertising) are being done, the method of sale, proper tare determination, labeling requirements, net content verification, and how to analyze test data.

There are no prerequisites to attend Part 1 of the LPG webinar series. OWM will also host parts 2 & 3 of the webinar series, ***Verifying the Net Contents at Refilling Locations and Point of Pack***. For additional information and to register, please see the OWM **Calendar of Events**.

Usage

There has been a significant increase in household and recreational use of LPG over the past decade. Exchange sites are now located at most retail locations, such as supermarkets, drugstores, hardware stores, and gas stations. There is even home delivery of the 20 lb LPG cylinders and 24-hour automated vending machines. In 2019 alone, there were over 10 billion gallons of propane sold, including over 50 million cylinders (**Propane Education and Research Council *Annual Retail Propane Sales Report 2019***).

The 20 lb LPG cylinder is the most common size in exchange programs, though they can be other sizes (e.g., 1 lb, 15 lb, 100 lb). It is called a 20 lb cylinder because that is the total weight of propane it will safely hold. Though it will safely hold 20 lb, most 20 lb cylinders are filled and labeled to a net weight of 15 lb. The total weight of a full cylinder, which includes the weight of the propane and the weight of the cylinder itself, can be close to 40 lb.

Properties of Propane

Propane gas is typically a mixture of propane and other gases, such as hydrocarbon gases (e.g., butane). Propane is colorless, odorless, and tasteless. But an additive must be added for safety reasons so that it will emit a smell (like a skunk) when exposed to oxygen. Even though propane is non-toxic, it is dangerous to inhale the vapor, which can cause dizziness, headache, and nausea at low concentrations and asphyxiation at high concentrations.

Propane has a specific gravity, based on 15.6 °C (60 °F) and 101 kPa (14.7 psia), that is 1.52, making it 1.52 times heavier than room temperature air. As a result, when released, the vapor will flow to the lowest point of a structure (e.g., drains, basements).

Method of Sale

The method of sale, or how LPG must be sold, can be found in **NIST Handbook 130 (HB 130),** ***Uniform Laws and Regulations in the Areas of Legal Metrology and Fuel Quality, Section 2.21. Liquified Petroleum Gas*****.**

LPG in general can be sold by weight, liquid measure, or gas vapor.

- The legal requirement for LPG sold in 20 lb cylinders is by the weight in either kilogram or pound.

- Refillers (e.g., when a 20 lb cylinder is taken to a refill location) of LPG can fill by liquid by the liter, defined at 15.6 °C (60 °F), or liquid by the gallon, defined at 231 in^3 at 15.6 °C (60 °F). Even though it is filled and sold by volume, federal law still requires that the seller verify the quantity by weight. This is done for safety reasons, primarily to prevent overfilling.

- LPG can also be sold by the cubic meter of gas vapor. A metered cubic foot of vapor [defined as 1 ft^3 at 60 °F (15.6 °C)], or the gallon [defined as 231 in^3 at 60 °F (15.6 °C)]. Selling by gas vapor often involves sub-metering, such as with supplying gas to apartment buildings or trailer parks using an underground or above ground storage tank.

Net Content Verification

The legal requirement for LPG sold in 20 lb cylinders is by weight. Whenever cylinders are used for the sale of compressed or liquefied gases by weight, or are filled by weight and converted to volume, the following must be applied for accurate net content verification. This can be found in **NIST HB 130,** ***Uniform Laws and Regulations in the*** *Areas* ***of Legal Metrology and Fuel Quality, Section 2.16. Compressed or Liquified Gases in Refillable Cylinders***.

- **Stamped or Stenciled Tare Weight** – For safety purposes, the tare weight shall be legibly and permanently stamped or stenciled on the cylinder. All tare weight values must be preceded by the letters "TW" or the words "tare weight." The tare weight must include the weight of the cylinder (including paint), valve, and other permanent attachments. Though not included as part of the stamped or stenciled tare weight, the weight of the label and the weight of the protective cap must be included in the total tare weight when verifying the net contents.

- **Allowable Difference –** If the stamped or stenciled tare is used to determine the net contents of the cylinder, the allowable difference between the actual tare weight and the stamped or stenciled tare weight, or the tare weight on a tag attached to the cylinder for a new or used cylinder, must be within the tolerances below. Comparing the actual to the stamped or stenciled tare weight is typically done at the plant.

  (1) ± $^1/_2$ % for tare weights of 9 kg (20 lb) or less; or

  (2) ± $^1/_4$ % for tare weights of more than 9 kg (20 lb).

- **Average Requirement** – At a single place of business, when used to determine the net contents of cylinders, the stamped or stenciled tare weights of cylinders found to be in error predominantly in a direction favorable to the seller and near the allowable difference limit is considered a method of sale violation.

New Department of Transportation Regulations

New Department of Transportation (DOT) Federal Regulations are set to go into effect and will be enforceable after December 28, 2022. The new requirements described below would increase the current tolerances found in **NIST HB 130, *Uniform Laws and Regulations in the Areas of Legal Metrology and Fuel Quality***. Unless opposing feedback regarding the new requirements is submitted to DOT prior to the effective date, the new regulation will automatically take effect on December 28, 2022.

- **Allowable Difference or Tolerance** – If the stamped or stenciled tare is used to determine the net contents of the cylinder, the tolerance between the actual tare weight and the stamped tare weight, shall be:

  (1) Minus 3 % or plus 1 % for a cylinder that weighs 11.34 kg (25 lb).

  (2) Minus 2 % or plus 1 % for a cylinder that weighs more than 11.34 kg (25 lb).

Currently in NIST HB 130 for cylinders that weigh 20 lb or less, the plus or minus tare weight is ½ %. Under the new DOT regulation, cylinders that weigh 25 lb or less, the minus tare weight tolerance will change to 3 % (more than 6 times the NIST HB 130 tolerance) and the plus tare weight will change to 1 % (double the NIST HB 130 tolerance).

For cylinders that weigh more than 25 lb, it gets even less stringent under the new DOT regulations. The minus tare weight tolerance will change to 2 % (8 times the **NIST HB 130** tolerance) and the plus tare weight will change to

1 % (4 times the NIST HB 130 tolerance).

- **Average Requirement** – The DOT regulations do not recognize the "Average Requirement" (as required in NIST HB 130, Method of Sale Regulation), which ultimately will be removed.

Labeling Requirements

A cylinder is considered a package under the **NIST HB 130**, Uniform Packaging and Labeling Regulation (UPLR). Exchange cabinets and vending machines must also meet the requirements of the UPLR.

National Fire Protection Association 58 "Liquified Petroleum Gas Code"

The National Fire Protection Association (NFPA) is a non-profit organization that publishes a *Liquified Petroleum Gas Code*. All states adopt this code as their law. Most state and local fire marshals have also adopted this code as their law. The requirements found in NFPA 58 do not conflict with Federal Regulation or NIST HB 130, Method of Sale Regulation. NFPA 58 also provides valuable information on ensuring safety in the handling of LPG.

Next Steps

State weights and measures can play a key role in collecting and analyzing data from inspections. Some items that need to be addressed prior to determining next steps include:

- A better understanding of net weight compliance. This data could be used to show the consumer and industry impact of both underfill and overfill and could point to the need for development of new good quantity control practices for the LPG industry.

- Overfill and Underfill Levels – this data can be used to show that current industry filling procedures are adequate, or that there is a need for the states to work with the National Propane Gas Association (NPGA), NFPA, Occupational Safety and Health Administration (OSHA), and U.S. DOT to cooperate on establishing better procedures and oversight.

- Returned LPG cylinders need to be examined more closely to determine how much (if any) that consumers leave in the cylinders. This data could be used to develop informational and educational materials for consumers on good practices to save money and make value comparisons. It can also be used to reinforce the need for good weighing practices at refilling stations.

- Data is needed comparing stamped and stenciled tare weight accuracy to the actual tare weight. This is typically done at the plant. This data could show justification to petition DOT to reconsider its new regulations so that current requirements in NIST HB 130 method of sale are not preempted.

- Another consideration should be to develop a more comprehensive method of sale regulation for LPG in NIST HB 130 that would provide clear guidance on good weighing procedures, advertising, unit pricing, and other opportunities. This would provide an easily accessible reference for all weighing and net content requirements instead of having the principles spread among different state regulations, federal regulations, and industry standards.

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