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DRAFT

BELIZE STANDARD

SPECIFICATION FOR LIQUEFIED PETROLEUM GAS (LPG)

This is a Draft and should not be regarded or used as a Belize Standard.

Last date for comments: TBD

Belize Bureau of Standards

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DRAFT BELIZE STANDARD

SPECIFICATION FOR LIQUEFIED PETROLEUM GAS

Committee Representation

The preparation of this standard for the Standards Advisory Council established under the Standards Act 1992, was carried out under the supervision of the Bureau's Technical Committee for LIQUEFIED Petroleum Gas (LPG), which at the time comprised the following members:

TECHNICAL COMMITTEE

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0 FOREWORD

0.1 Liquefied petroleum gas products are composed of those readily liquefied hydrocarbon compounds that are gaseous under ambient conditions and produced in the course of processing natural gas and also in the course of the conventional refining of crude oil. The composition of liquefied gases can vary widely depending upon the source and the nature of the treatment to which the products have been subjected.

0.2 There are many uses for liquefied petroleum gases as follows:

(a) as domestic, commercial and industrial fuels;

(b) as a carbon source material in metal treating operations;

(c) as refinery raw materials for synthesis of gasoline components; and

(d) as petrochemical raw materials.

0.3 The nature of the needs dictates the required composition characteristics in these various applications. Since the last three uses of those listed are in the category of specialty applications, which involves special requirements, they are excluded from consideration.

0.4 In substance this specification is designed to properly define acceptable products for domestic, commercial and industrial fuels.

0.5 In the formulation of this standard considerable assistance was derived from the following standards:

a) ASTM D 1835-22 - Standard Specification for Liquefied Petroleum (LPG) Gases – American Standard Test Method.

1 SCOPE

1.1 This specification covers those products commonly referred to as liquefied petroleum gases consisting of propane, propene (propylene), butane and mixtures of those materials. Three basic types of liquefied petroleum gases are provided to cover the common use applications.

1.2 This specification is applicable to products intended for use as domestic, commercial and industrial heating and engine fuels.

1.3 The values stated in SI units are to be regarded as the standard. The imperial values are given for information. This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to adhere to industry health and safety practices and regulatory limitations.

2 NORMATIVE REFERENCES

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ASTM D1267-23	Standard Test Method for Gage Vapor Pressure of Liquefied Petroleum (LP) Gases (LP-Gas Method);
ASTM D1837-02a (2007)	Standard Test Method for Volatility of Liquefied Petroleum (LP) Gases;
ASTM D2163-23	Standard Test Method for Determination of Hydrocarbons in Liquefied Petroleum (LP) Gases and Propane/Propene Mixtures by Gas Chromatography;
ASTM D2158-21	Standard Test Method for Residues in Liquefied Petroleum (LP) Gases;
ASTM D1838-21	Standard Test Method for Copper Strip Corrosion by Liquefied Petroleum (LP) Gases;
ASTM D6667-21	Standard Test Method for Determination of Total Volatile Sulfur in Gaseous Hydrocarbons and Liquefied Petroleum Gases by Ultraviolet Fluorescence;
ASTM D 2420-23	Standard Test Method for Hydrogen Sulfide in Liquefied Petroleum (LP) Gases (Lead Acetate Method); and
ASTM D3700 - 21	Standard Practices for Obtaining LPG Samples Using a Floating Piston Cylinder.
ISO 4257:2001	Liquefied petroleum gases -- Method of sampling;
ISO 4259-1	Petroleum and related products- Precision of measurement methods and results- Part 1: Determination of precision data in relation to methods of test
ISO 3993:1984	Liquefied petroleum gas and light hydrocarbons -- Determination of density or relative density -- Pressure hydrometer method;
ISO 8973:1997	Liquefied petroleum gases -- Calculation method for density and vapour pressure; and

ISO 7941:1988	Commercial propane and butane -- Analysis by gas chromatography.

3 TERMS AND DEFINITIONS

For the purpose of this standard the following definitions apply.

3.1 **Commercial butane** means a hydrocarbon product composed predominantly of butane/butane isomers, and or butylenes for use where a low volatility is required.

3.2 **Commercial Propane Butane (PB) mixtures** means mixtures of propane and butane for use where intermediate volatility is required.

3.3 **Commercial/HD-10 propane** means a hydrocarbon product composed predominantly of propane and no more than 10 liquid percent propylene for use where high volatility is required.

3.4 **Liquefied petroleum gas** means a by-product resulting from the processing of natural gas or petroleum gas or from petroleum refining, consisting of low-boiling hydrocarbons that exist individually or as a mixture in a gaseous state at normal ambient temperature and pressure and includes propane, propylene, butane, and butylenes with limited amounts of other hydrocarbons (such as ethane) and naturally occurring petroleum derived from non-hydrocarbons.

3.5 **Special duty/HD5propane** means a hydrocarbon product composed not less than 90 liquid volume percent propane and not more than 5 percent propylene, which exhibits superior anti-knock characteristics when used in an internal combustion engine.

4 REQUIREMENTS

4.1 General

When determined in accordance with the methods in Table 1, the properties of Liquefied Petroleum Gas shall be in accordance with the limiting requirements given in that table.

NOTE: Individual contractual agreements, national standards, national safety codes and/or requirements of distribution systems may prescribe other limits.

Table 1 – Specifications for Liquefied Petroleum Gases

Characteristics	Method of Test(s)	Commercial/ HD-10 propane	Commercial butane	Commercial PB mixture	Special Duty/ HD-5 Propane
Composition of LPG	ASTM D 1835-22	No less than 85 liquid volume percent propane and not more than 10 liquid volume percent propylene.	Not less than 96 liquid volume percent and butane isomers.	Mixture of commercial butane and commercial/ HD-5 propane containing not less than 62 liquid volume percent propane; not less than 28 liquid volume percent butane and; no more than 10 percent liquid volume percent of other allowable components.	Not less than 90% liquid volume percent propane and not more than 5 liquid volume percent of propylene.
Gauge vapour pressure at 37.8°C kPa, max (psig) (max)	ASTM D1267	1435 208	483 70	1267 185	1435 208
Heavier hydrocarbon contaminants Butane and heavier, max, vol %	ASTM D2163	2.5	Not applicable	Not applicable	2.5
Pentane and heavier, max, vol %	ASTM D2163	Not applicable	2.0	2.0	Not applicable

Residue on evaporation 100ml, max ml	ASTM D2158	0.05	0.05	0.05	0.05
Oil stain observation	ASTM D2158	Pass	Pass	Pass	Pass
Corrosion copper, strip	ASTM D1838	No. 1	No. 1	No. 1	No. 1
Sulphur, mg/kg (ppm by mass), max	ASTM D6667	185	140	140	123
Hydrogen sulphide	ASTM D2420	Pass	Pass	Pass	Pass
Free water content	Visual Inspection	Not applicable	None	None	Not applicable
Moisture Content	ASTM D 2713	Pass	Not applicable	Not applicable	Pass
Stenching Limit (mercapan sulphur concentration, ppm)	ASTM D 5305	10 - 50			

4.2 Composition of LPG

4.2.1 Commercial butane shall be more than 96% by liquid volume of butane, butane isomers and butylene; the remaining part may consist mainly of propane/propene and pentane/pentane isomers.

4.2.2 Commercial PB Mixtures shall be a mixture of commercial butane and special duty HD-5 propane containing not less than 62 liquid volume percent propane; 28 liquid volume percent butane; and no more than 10 percent liquid volume percent of other allowable components.

4.2.3 Commercial propane shall be product of no less than 85 liquid volume percent of propane and no more than 10 liquid volume percent propylene; the remaining part may consist mainly of ethane, and butane/butane isomers.

4.2.4 Special duty/HD-5 propane shall be a product not less than ninety (90) liquid volume percent propane and not more than 5 liquid volume percent of propylene.

4.2.5 The requirements for the commercial butane, Commercial/HD-10 propane, Special Duty/HD-5propane and, Commercial propane/butane mixtures shall meet the limits specified in Table 1 when tested in accordance with the relevant test methods in Table 1.

4.2.6 Commercial butane and Special Duty/HD-5 propane/butane shall have the compositions stated in Table 1 and shall not contain free or suspended water detectable by visual inspection. (See Table 1).

4.2.7 Commercial propane and special duty/HD-5 propane shall have moisture content as measured by ASTM D 2713 in Table 1.

4.3 Stenching of LPG

All LPG gases shall be odorised by the addition of a stenching agent that is rendered distinctive and unpleasant, prior to the delivery to a distributing plant. Such a stenching agent shall be detectable, by a distinct odour, down to a concentration in air of not over 20 % of the lower limit of flammability when tested in accordance with ASTM D 5305.

4.4 Precision and interpretation of test results

Most of the methods of tests given in Table 1 contain a statement of the precision, i.e. the repeatability and reproducibility, to be expected from them but, in cases of dispute, the procedure described in ISO 4259, which uses precision data in the interpretation of test results shall be used.

4.5 Additional information to be supplied by the vendor to the purchaser (in writing).

The vendor of the LPG may supply the purchaser with the following additional information:

a) Density: The density, in kilograms per cubic meter at 27 °C, determined by the method in ISO 3993/ISO 8973;

b) C2 hydrocarbon content: The molar percentage of C2 hydrocarbons and the method used to carry out the determination.

c) Unsaturated hydrocarbons: The molar percentage of unsaturated hydrocarbons, determined in accordance with ISO 7941;

d) Residual matter: The residual matter, in milligrams per kilogram, and the method used to carry out the determination.

5 DOCUMENTATION

The documentation supplied to the purchaser by the vendor shall include at least the following:

a) A reference to this National Standard;

b) The type of Liquefied Petroleum Gas supplied, i.e. commercial propane, commercial butane or commercial PB mixture;

c) Precautionary and safety advice.

NOTE: If a transportable container is supplied with the liquefied petroleum gas, it shall also be clearly marked with this information.

6 SAMPLING

Proper sampling of liquefied gases is extremely important if the test results are to be significant. Representative sample shall be taken in accordance with the procedure given in ISO 4257 or ASTM 3700.