



شرکت ملی گاز ایران

مدیریت پژوهش و فناوری

امور تدوین استانداردها

IGS

مشخصات فنی خرید

مشخصات پروپان ، بوتان و گاز مایع LPG

Propane , Buthane and LPG Specifications



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شرکت ملی گاز ایران



دفتر مدیر عامل



## ابلاغ مصوبه هیأت مدیره



مدیر محترم پژوهش و فناوری

باسلام،

به استحضار می‌رساند در جلسه ۱۶۷۶ مورخ ۱۳۹۵/۱/۱۷ هیأت مدیره، نامه شماره گ/۹/۰۰۰/۱۸۸۱۸۳ مورخ ۹۴/۱۲/۲۶ مدیر پژوهش و فناوری در مورد تصویب نهایی استاندارد تحت عنوان استاندارد گاز مایع شرکت ملی گاز ایران " به شماره استاندارد (0) IGS-M-CH-058(0) مطرح و مورد تصویب قرار گرفت .

این مصوبه در حکم مصوبه مجمع عمومی شرکت‌های تابعه محسوب و برای کلیه شرکت‌های تابعه لازم الاجرا می‌باشد .

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## FOREWORD

This standard is intended to be mainly used by NIGC and contractors, and has been prepared based on interpretation of recognized standards, technical documents, knowledge, backgrounds and experiences in Propane, Butane & LPG industry at national and international levels.

Iranian Gas Standards (IGS) are prepared, reviewed and amended by technical standard committees within NIGC Standardization division and submitted to the NIGC's "STANDARDS COUNCIL" for approval.

IGS Standards are subject to revision, amendment or withdrawal, if required. Thus the latest edition of IGS shall be checked/inquired by NIGC employees and contractors.

This standard must not be modified or altered by NIGC employees or its contractors. Any deviation from normative references and / or well-known manufacturer's specifications must be reported to Standardization division.

The technical standard committee welcomes comments and feedbacks about this standard, and may revise this document accordingly based on the received feedbacks.

## **GENERAL DEFINITIONS:**

Throughout this standard the following definitions, where applicable, should be followed:

- 1- "STANDARDIZATION DIV." is organized to deal with all aspects of industry standards in NIGC. Therefore, all enquiries for clarification or amendments are requested to be directed to mentioned division.
- 2- "COMPANY": refers to National Iranian Gas Company (NIGC).
- 3- "SUPPLIER": refers to a firm who will supply the service, equipment or material to NIGC whether as the prime producer or manufacturer or a trading firm.
- 4- "SHALL ": is used where a provision is mandatory.
- 5- "SHOULD": is used where a provision is advised only.
- 6- "MAY": is used where a provision is completely discretionary.

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## INTRODUCTION

Due to the lack of documented standard accordance with international specification for Propane, Butane and LPG that approved by the NIGC, policies in the construction of the new units or modification and revamping of existing ones, were diversified.

This standard is documented in order to have identical Propane, Butane and LPG specifications with the aim of entrance to international export market or diversification for customers and market management. Therefore, the main reasons for this technical standard are:

1. A guideline for designing of new or modification of existing propane, butane and LPG units.
2. Boosting of export of propane, butane and LPG

This standard specification is the result of a remarkable effort made by a specialized committee. The committee started with collecting information about:

1. The latest edition of international specification, references, publications, and investigation results,
2. LPG specifications of existing Propane, Butane & LPG units in gas treating plants on design basis and experimental data.
3. Consumers need

The initial draft was then distributed to various departments of NIGC and international affairs of NIOC to get their feedbacks. Then the committee began to review the received feedbacks and revised the content of the mentioned draft.

## 1. SCOPE

This specification covers requirements for Propane, Butane and LPG products of gas treating plants and is applicable for NIGC or its contractors to design new units or modification and revamping of existing ones in future. This standard specification specifies physical properties, compositions and test methods of Propane, Butane and LPG.

## 2. SIGNIFICANCE AND USE

The objective of this standard specification is a guideline for designers and modifiers of Propane, Butane and LPG units in gas treating plants that choose processes to achieve the Propane, Butane and LPG quality described in this standard specification.

## 3. REFERENCES

Documents referred to this standard specification are listed in Section 3.1 as normative references.

### 3.1 Normative References

Throughout this standard specification the following standards are referred to. The editions of these standards that are in effect of the time of issuing this standard specification (2015) shall form part of these standard specifications. The applicability of changes in standards that occur after the date of these standard specifications shall be mutually agreed upon by the NIGC and the buyers and/or consumers.

**ASTM D 1266 (2013)** Standard Test Method for Sulfur in Petroleum Products (Lamp Method)

**ASTM D 1267 (2012)** Standard Test Method for Gage Vapor Pressure of Liquefied Petroleum (LP) Gases (LP-Gas Method)

**ASTM D 1744 (2013)** Standard Test Method for Determination of Water in Liquid Petroleum Products by Karl Fischer Reagent

**ASTM D 1835 (2013)** Standard Specification for Liquefied Petroleum (LP) Gases

**ASTM D 1838 (2014)** Standard Test Method for Copper Strip Corrosion by Liquefied Petroleum (LP) Gases

**ASTM D 2158 (2011)** Standard Test Method for Residues in Liquefied Petroleum (LP) Gases

**ASTM D 2163 (2014)** Standard Test Method for Determination of Hydrocarbons in Liquefied Petroleum (LP) Gases and Propane/Propane Mixtures by Gas Chromatography

**ASTM D 2420 (2013)** Standard Test Method for Hydrogen Sulfide in Liquefied Petroleum (LP) Gases (Lead Acetate Method)

**ASTM D 2598 (2012)** Standard Practice for Calculation of Certain Physical Properties of Liquefied Petroleum (LP) Gases from Compositional Analysis.

**ASTM D 2713 (2013)** Standard Test Method for Dryness of Propane (Valve Freeze Method)

**ASTM D 2784 (2011)** Standard Test Method for Sulfur in Liquefied Petroleum Gases (Oxy-Hydrogen Burner or Lamp)

**ASTM D 3246 (2014)** Standard Test Method for Sulfur in Petroleum Gas by Oxidative Microcoulometry.

**ASTM D 5453 (2012)** Test Method for Determination of Total Sulfur in Light Hydrocarbons, Spark Ignition Engine Fuel, Diesel Engine Fuel, and Engine Oil by Ultraviolet Fluorescence.

## 4. DEFINITIONS

For the purposes of this standard, the following definitions shall apply.

### 4.1 LPG

Predominately propane or butane, either separately or in mixtures, which is maintained in a liquid state under specific pressure/ temperature within the confining vessel.

### 4.2 Quality

The quality of Propane, Butane & LPG is defined by its composition and the following physical properties.

### 4.3 Density

The mass of the Propane, Butane & LPG divided by its volume at specified pressure and temperature.

### 4.4 Specific Gravity

The ratio of the mass of a given volume of a substance to that of another equal volume of another substance used as standard. Unless otherwise stated, air is used as the standard for gases and water for liquids, with the volumes measured at 60°F and standard atmospheric pressure.

### 4.5 Propane, Butane & LPG Composition

The concentrations of the major and minor components and trace constituents in Propane, Butane & LPG as analyzed.

#### **4.6 Propane, Butane & LPG Analysis**

The use of test methods and other techniques for determining the Propane, Butane & LPG composition, as stated in this standard specification.

#### **4.7 Limit**

The value beyond which the specified characteristic or concentration of the component is not permitted to vary.

#### **4.8 Vapor Pressure**

The pressure exerted by the equilibrium vapor of a liquid when confined in a closed evacuated tank or test apparatus.

#### **4.9 Total Sulfur**

Total amount of sulfur found in Propane, Butane & LPG.

**Note:** The total amount of sulfur, both organic and inorganic i.e. hydrogen sulfide, sulfur oxides, mercaptans, carbonyl sulfides, ... , may be determined by an analytical method not differentiating between individual sulfur compounds combustion methods.

#### **4.10 Hydrogen Sulfide**

Total amount of Hydrogen sulfide found in Propane, Butane & LPG.

#### **4.11 Water Content**

Mass concentration of the total amount of water contained in Propane, Butane & LPG.

#### **4.12 Residues**

The low grade oil products that remain after the distillation of Propane, Butane & LPG.

#### **4.13 Corrosion (copper strip)**

This is a qualitative method that is used to determine the level of corrosion of petroleum products. In this test, a polished copper strip is suspended in the product and its effect observed.

### **5. REQUIREMENTS**

This clause deals with the various Tables which shall be referred to in a designation of the quality of Propane, Butane & LPG. The Tables actually selected will depend upon the purpose for which the designation is required.

#### **5.1 Properties**

**5.1.1** The specifications for Propane, Butane & LPG for different purposes are provided in Tables 1, 2 and 3.



**5.1.2** The properties for outlet of Propane, Butane & LPG of new or modified units in gas treating plants, to customers shall be complied with Tables 1, 2 and 3 when tested in accordance with test methods specified. The relative test methods are specified for any properties.

**5.1.3** The new or modified units in gas treating plants shall be designed according to the properties of Propane, Butane & LPG products of given in Tables 1, 2 and 3

**TABLE 1 – Specification Quality Limits for Propane Delivery to Customers**

Item	Component	Unit	Minimum	Maximum	Test Methods
1	Sp.gr. @60	-	0.48	0.52	ASTM D 2598
2	Methane	ppm v	-	NIL	ASTM D 2163
3	Ethane	Vol %	-	2.0	ASTM D 2163
4	Propane	Vol %	96	-	ASTM D 2163
5	Butanes	Vol %	-	2.0	ASTM D 2163
6	Pentanes & Heavier	Vol %	-	0.05	ASTM D 2163
7	Vapor pressure @100 °F	psig	-	200	ASTM D 1267 ASTM D 2598
8	Corrosion (copper strip)		-	No.1 strip	ASTM D 1838
9	Total sulfur	ppmw	-	30	ASTM D 1266,2784
10	Hydrogen sulfide	ppmv	-	Negative (<4 ppmv)	ASTM D 2420
11	Water Content	ppmw	-	Pass (<10 ppmw)	ASTM D 2713
12	Residues 1) Residue number 2) Oil number	ppmw	-	0.05	ASTM D 2158

**TABLE 2 – Specification Quality Limits for Butane Delivery to Customers**

Item	Component	Unit	Minimum	Maximum	Test Methods
1	Sp.gr. @60		0.56	0.60	ASTM D 2598
2	Methane	ppm	-	NIL	ASTM D 2163
3	Ethane	Vol%	-	0.08	ASTM D 2163
4	Propane	Vol%	-	2	ASTM D 2163
5	Butanes	Vol%	97.0	-	ASTM D 2163
6	Pentanes & Heavier	Vol%	-	1.0	ASTM D 2163
7	Vapor pressure @100 °F	psig	-	70	ASTM D 1267 ASTM D 2598
8	Corrosion (copper strip)		-	No.1 strip	ASTM D 1838,5453
9	Total sulfur	ppmw	-	30	ASTM D 1266,2784
10	Hydrogen sulfide	ppmv	-	Negative (<4 ppmv)	ASTM D 2420
11	Water Content	ppmw	-	10	ASTM D1744, 2713
12	Free Water		-	None	Visual
13	Residues 1) Residue number 2) Oil number	ppmw	-	0.05	ASTM D 2158

**TABLE 3 – Specification Quality Limits for LPG Delivery to Customers**

Item	Component	Unit	Minimum	Maximum	Test Methods
1	Sp.gr. @60		(*)		ASTM D 2598
2	Methane	ppmv	-	NIL	ASTM D 2163
3	Ethane	Vol%	-	1	ASTM D 2163
4	Propane	Vol%	97 (*)		ASTM D 2163
5	Butanes	Vol%			ASTM D 2163
6	Pentanes & Heavier	Vol%	-	2	ASTM D 2163
7	Vapor pressure @100 °F	psig	(*)		ASTM D 1267 ASTM D 2598
8	Corrosion (copper strip)		-	No.1 strip	ASTM D 1838,5453
9	Total sulfur	ppmw	-	30	ASTM D 1266,2784
10	Hydrogen sulfide	ppmv	-	Negative (<4 ppmv)	ASTM D 2420
11	Water Content	ppmw	-	10	ASTM D1744, 2713
12	Free Water		-	None	Visual
13	Residues 1) Residue number 2) Oil number	ppmw	-	0.05	ASTM D 2158

(\*): Specification of LPG is subject to percentage of Propane and Butane and relying on contractual requirements between buyer and seller.