IS 4576 (1999): Liquefied Petroleum Gases [PCD 3: Petroleum, Lubricants and their Related Products]

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IS 4576 : 1999
(Reaffirmed 2009)

भारतीय मानक

द्रवित पेट्रोलियम गैसेस — विशिष्टि

(दूसरा पुनरीक्षण)

Indian Standard

LIQUEFIED PETROLEUM GASES — SPECIFICATION

(Second Revision)

First Reprint JANUARY 2010
(Including Amendment No. 1)

ICS 75.160.30

BUREAU OF INDIAN STANDARDS

AMENDMENT NO. 1 MAY 2003
TO
IS 4576 : 1999 LIQUEFIED PETROLEUM GASES — SPECIFICATION

(Second Revision)

[*Page* 2, *Table* 1, *Sl No.* (ii), *col* 2, *line* 1] — Substitute 'Composition, liquid volume percentage' *for* 'Composition, liquid mole percentage'.

(PCD 3)

1—396 BIS/ND/09

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Petroleum Products Sectional Committee had been approved by the Petroleum, Coal and Related Products ~~Division Council.~~

This standard was first issued in 1968. In the first revision, in order to restrict the production of LPG for present as well as for future refineries to a maximum vapour pressure, which is the design pressure of the existing LPG cylinders produced in the country, the vapour pressure of commercial butane-propane mixture had been changed to 16.87 kgf/cm^2, *Max* at 65°C from its present range of 10 to 20 kgf/cm^2. The present version (second revision) has been taken up as a result of review of this standard in the light of the present day requirements and availability of LPG in the country. In this revision characteristics for composition has been included and residue on evaporation has been deleted. Requirement for total volatile sulphur, hydrogen sulphide have been changed. Dryness has been replaced by free water content. Based on ISO 9162 : 1989 requirement for vapour pressure has now been changed to 520, 1 050 and 1 550 kPa at 40°C, *Max*, respectively for butane, butane propane mixture and propane.

Taking into consideration the views of producers and suppliers of liquefied petroleum gases, fuel technologies and the interest of consumers, the Committee decided to relate this standard to the manufacturing practices followed in the country, keeping in view the need for international coordination among the principal standards in this field. Assistance has been derived from the following standards:

ISO 9162 : 1989	Petroleum products — Fuels (class F) — Liquefied petroleum gases — Specification
DIN 51622-1973	Fluessiggas; propan, propylen, butan and und-butylen, anforderungen in die qualitaet (Liquefied gas; propane, propylene, butane and butylene, quality requirements). Deutscher Normenausschuss
ASTM D 1835	Specification for liquefied petroleum (LP) gases

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

LIQUEFIED PETROLEUM GASES — SPECIFICATION

(Second Revision)

1 SCOPE

This standard prescribes the requirements and methods of sampling and test for all types of liquefied petroleum gases commercially marked for household, commercial and industrial applications excluding automotive use.

2 NORMATIVE REFERENCES

The following Indian Standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subjected to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
1260 (Part 1) : 1973	Pictorial marking for handling and labelling of goods : Part 1 Dangerous good (*first revision*)
1447 (Part 2) : 1992	Methods of sampling of petroleum and its products : Part 2 Sampling of liquefied petroleum gases (LPG) (*first revision*)
1448 (Part 70) : 1968	Methods of test for petroleum and its products: Part 70 Residue in liquefied petroleum gases
2825 : 1969	Code for unfired pressure vessels
3196 (Part 1) : 1992	Welded low carbon steel cylinder exceeding 5 litre water capacity for low pressure liquefied gases : Part 1 Cylinders for liquefied petroleum gas (LPG) (*fourth revision*)

3 TERMINOLOGY

For the purpose of this standard, the following definition shall apply.

3.1 Liquefied Petroleum Gas (LP Gas or LPG)

The term applies to a mixture of certain light hydrocarbons derived from petroleum which are gaseous at normal ambient temperature and atmospheric pressure but may be condensed to the liquid state at normal ambient temperature by the application of moderate pressure.

3.1.1 LP gases mainly consist of one or more of the following hydrocarbons:

a) Propane (C_3H_8)
b) Propylene (C_3H_6)
c) n-butane (C_4H_{10})
d) Iso-butane (C_4H_{10})
e) Butylene (C_4H_8)

3.1.2 Small quantities of one or more of the following hydrocarbons may also be present:

a) Ethane (C_2H_6)
b) Ethylene (C_2H_4)
c) Pentane (C_5H_{12})
d) Pentene (C_5H_{10})

4 TYPES

4.1 This standard specifies three types of LP gases, based on their principal constituent(s):

a) *Commercial Butane* — A hydrocarbon product composed predominantly of butanes, butylenes or their mixtures.
b) *Commercial Butane* — Propane Mixture — A hydrocarbon product composed predominantly of a mixture of butanes and/or butylenes with propane and/or propylene.
c) *Commercial Propane* — A hydrocarbon product composed predominantly of propane, propylene or their mixtures.

5 REQUIREMENTS

5.1 The material shall comply with the requirements given in Table 1 when tested according to appropriate methods given in col 6 of Table 1.

5.2 Residue of LPG

Subject to agreement between the purchaser and the supplier, the material shall also pass the agreed limits of residue when tested according to IS 1448 [P:70].

6 PACKING AND MARKING

6.1 Packing

The material shall be packed in suitable cylinders/containers as agreed to between the purchaser and the supplier and subject to the requirements prescribed by statutory authorities in this regard (For cylinders, *see* IS 3196 and for comments, *see* IS 2825).

6.2 Marking

The cylinders/containers shall be marked as prescribed by statutory authorities in this regard. They shall bear the labels marked with the following information:

a) Name and type of the material;
b) Mass in kg of the material in the container;
c) Maximum vapour pressure in case of commercial butane-propane mixture only; and
d) Manufacturer's name and trade-mark, if any

6.2.1 Each cylinder/container shall also be marked with the caution label 'FLAMMABLE' together with the corresponding symbol for labelling dangerous goods [*see* Fig. 18 of IS 1260 (Part 1)].

6.2.2 *BIS Certification Marking*

The cylinder/container may also be marked with the standard mark.

6.2.2.1 The use of Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act,* 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufactures or producers may be obtained from the Bureau of Indian Standards.

7 SAMPLING

7.1 Representative samples of liquefied petroleum gas shall be drawn as prescribed in IS 1447 (Part 2).

7.2 Tests on vapour pressure shall be conducted on individual samples and the rest of the tests shall be conducted on composite samples.

Table 1 Requirements for Liquefied Petroleum Gases

(*Clause* 5.1)

Sl No.	Characteristics	Requirement for Commercial			Method of Test, Ref to
		Butane	Butane Mixture	Propane	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Vapour pressure at 40°C, kPa, gauge, *Max* (Note 1)	520	1 050 (Note 2)	1 550	D 1267
ii)	Composition, liquid mole percentage				D 2163
	a) C2 Hydrocarbons	—	Report	Report	
	b) C3 Hydrocarbons	Report	Report	95.0 *Min*	
	c) C4 Hydrocarbons	Report	Report	4.0 *Max*	
	d) C5 Hydrocarbons and heavier	2.5 *Max*	2.5 *Max*	0.2 *Max*	
	e) Unsaturated hydrocarbons	Report	Report	Report	
	OR				
	Volatility: Evaporation temperature in °C for 95 percent by volume at 760 mm Hg pressure, *Max*	2.0	2.0	– 38.0	D 1837
iii)	Total volatile sulphur ppm, *Max*	150	150	150	D 2784 D 3246
iv)	Copper strip corrosion at 38°C for 1 h		Not worse than No 1		D 1838
v)	Hydrogen sulphide	Pass	Pass	Pass	D 2420 (Note 3)
vi)	Free water content	None	None	None	Visual

ASTM test methods shall be followed till 'P' of IS 1448 methods under revision, are finalized.

NOTES

1 Vapour pressure may be determined at any other temperature and converted to 40°C by means of suitable vapour pressure-temperature graph. The same can also be determined by analyzing the gas by means of a gas chromatograph and then using the composition, the vapour pressure can be calculated at 40°C from the standard values of vapour pressures at various temperatures.

2 Each consignment of commercial butane-propane mixture shall be designated by its maximum vapour pressure in kPa at 40°C.

Further, if purchaser and the supplier agreed, the minimum vapour pressure of that mixture shall be not lower than 200 kPa gauge compared to the designated maximum vapour pressures and in any case the minimum for the mixture shall be not lower than 520 kPa at 40°C.

3 'Pass' test indicates Hydrogen Sulphide not more than 5 ppm.

4 Subject to agreement between the purchaser and the supplier, odour requirements of LPG may be changed for certain applications when unodourized LPG is required.

5 Product shall contain minimum 20 ppm ethyl mercaptan at the first despatching location to ensure the detection of odour.

To detect the odour, the following procedures may be adopted:

5 ml Doctor Solution + 8 ml Iso-octane + Pinch of sulphur powder in 25 ml stoppered cylinder. Shake and add 2 ml LPG (Aq). Shake slowly by releasing pressure.

Odour is adequate if sulphur turns yellowish brown.

P : 75 Odour test method may also be acceptable as an alternate method.

Bureau of Indian Standards

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This Indian Standard has been developed from Doc : No. PCD 3 (1705).

Amendments Issued Since Publication

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