

Table- LIQUEFIED PETROLEUM GASES

Test	ANALYSIS	UNITS	PROPANE		BUTANE		LPG		TEST METHOD	
			LIMITS		LIMITS		LIMITS		ASTM	OTHER
			Min	Max	Min	Max	Min	Max		
1	Vapor pressure at 37.8°C (100°F)	KPa		1434		483	(see note 1)		D1267/ 2598 / 6897 (see note 2)	
		psi		208		70				
2	C ₂ Hydrocarbon	% v/v		1		0.2		0.2	D 2163	
3	C ₃ Hydrocarbon	% v/v	96			2	•		D 2163	
4	C ₄ Hydrocarbon	% v/v		3	96		•		D 2163	
5	C ₅ *Hydrocarbon	% v/v		0.05		2		2	D 2163	
6	Specific Gravity @15.6°C/15.6°C		To be reported		To be reported		To be reported		D 1657/2598	
7	Total Sulfur (see note 3)	mg/Kg		185		140		140	D 2784/6667/ 3246	UOP 791
8	Hydrogen Sulfide		Negative		Negative		Negative		D 2420	
9	Mercaptan Sulfur	g/m ³		0.3		0.23		0.23	-	IP 272 UOP 212 BS 272
							(see note 4)			
10	Odorizing Agent in liquid phase (see note 5)	g/m ³	-	-	-	-	12		D 5305	
11	Moisture Content	mg/Kg	pass			-		-	D 2713	
12	Free water content (see note 6)		-		None		None			
13	Residual matter:								D2158	
	Residue on evaporation of 100 mL	mL		0.05		0.05		0.05		
	Oil stain observation		pass		pass		pass			

*varies seasonally for refineries as follows:

(ABADAN, BANDAR ABBAS, LAVAN, PERSIAN GULF STAR)

% v/v	1 st KHORDAD TO 1 st MEHR	1 st MEHR TO 1 st AZAR	1 st AZAR TO 1 st ESFAND	1 st ESFAND TO 1 st KHORDAD
C ₃ 's	15-35	30-50	45-70	30-50
C ₄ 's	85-65	70-50	55-30	70-50

(TEHRAN, ARAK, SHIRAZ, KERMANSHAH, ISFAHAN)

% v/v	1st KHORDAD TO 1st SHAHRIVAR	1st SHAHRIVAR TO 1st ABAN	1st ABAN TO 1st FARVARDIN	1st FARVARDIN TO 1st KHORDAD
C ₃ s	15-35	30-50	45-70	30-50
C ₄ s	85-65	70-50	55-30	70-50

(TABRIZ)

% v/v	1st TIR TO 1st SHAHRIVAR	1st SHAHRIVAR TO 1st ABAN	1st ABAN TO 1st ORDIBEHESHT	1st ORDIBEHESHT TO 1st TIR
C ₃ s	15-35	30-50	45-70	30-50
C ₄ s	85-65	70-50	55-30	70-50

Note 1: The permissible vapor pressures of products classified as PB mixtures shall not exceed 208 psig (1435 KPa) and additionally shall not exceed the pressure calculated in psig from the following relationship between the observed vapor pressure at 100°F (37.8°C) and the observed relative density at either 60°F or 15.6°C:

$$\begin{aligned}\text{Vapor pressure, psig, max} \\ &= 1167 - 1880 (\text{relative density at } 60/60^{\circ}\text{F}) \\ &= 1167 - 1880 (\text{relative density at } 15.6/15.6^{\circ}\text{C})\end{aligned}$$

A specific mixture shall be designated by the vapor pressure at 100°F in pounds per square inch gage. To comply with the designation, the vapor pressure shall be within +0 to -10 psi of the vapor pressure specified. (According to ASTM D1835-18a)

Note 2: In case of dispute about the vapor pressure of a product, the value actually determined by Test Method D1267 shall prevail over the value calculated by Practice D2598 or measured by Test Method D6897.

Note 3: The total sulfur limits in these specifications do include sulfur compounds used for odorizing purposes. It will be obligatory for all of the refineries from 1403/1/1.

Note 4: It is about 110 ppm. The limit applies to the product before addition of odorizing agent. Drager devices can be also applied, in cases of dispute concerning Mercaptan Sulfur content, either IP272 or UOP212 or BS272 shall be used. This analysis should not be considered for Propane and Butane from 1403/1/1.

Note 5: It can be converted to ppm according to Annex (A1.2) in ASTM D-5305:

$$\text{ppmv} = ((\text{mg}/\text{m}^3) \cdot (24.45)) / (\text{mol weight Ethyl Mercaptan})$$

For example, if it assumes the density of the LPG is 550 kg/m³, 12 g/m³ will be about 9 ppmwt.

Note 6: The presence or absence of water may be determined by visual inspection of the samples on which the density or relative density is determined.