



SLOVENSKI STANDARD

oSIST prEN 589:2023

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Goriva za motorna vozila - Utekočinjeni naftni plin (UNP) - Zahteve in preskusne metode

Automotive fuels - LPG - Requirements and test methods

Kraftstoffe - Flüssiggas - Anforderungen und Prüfverfahren

Carburants pour automobiles - GPL - Exigences et méthodes d'essai

Ta slovenski standard je istoveten z: **prEN 589**

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75.160.20 Tekoča goriva Liquid fuels

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English Version

Automotive fuels - LPG - Requirements and test methods

Carburants pour automobiles - GPL - Exigences et méthodes d'essai

Kraftstoffe - Flüssiggas - Anforderungen und Prüfverfahren

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 589:2023) has been prepared by Technical Committee CEN/TC 19 “Gaseous and liquid fuels, lubricants and related products of petroleum, synthetic and biological origin”, the secretariat of which is held by NEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 589:2018+A1:2022.

This is the 8th edition of EN 589. The main technical changes include:

- a) change of vapour pressure requirement, increase of minimum vapour pressure;
- b) change of limit value for 1,3 butadiene to <0,10 % m/m.

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1 Scope

This document specifies requirements and test methods for marketed and delivered automotive LPG (commonly known as low pressure gas or liquefied petroleum gas).

This document is applicable to automotive LPG for use in LPG engine vehicles designed to run on automotive LPG.

NOTE For the purposes of this document, the terms “% (m/m)” and “% (V/V)” are used to represent respectively the mass fraction, μ , and the volume fraction, φ .

WARNING — Attention is drawn to the risk of fire and explosion when handling LPG and to the hazard to health arising through inhalation of excessive amounts of LPG.

LPG is a highly volatile hydrocarbon liquid which is normally stored under pressure. If the pressure is released large volumes of gas will be produced which form flammable mixtures with air over the range of approximately 2% (V/V) to 10% (V/V). This document involves the sampling, handling and testing of LPG. Naked flames, unprotected electrical equipment electrostatic hazards etc. are sources of ignition for LPG.

LPG in liquid form can cause cold burns to the skin. The national health and safety regulations apply.

LPG is heavier than air and accumulates in cavities. There is a danger of suffocation when inhaling high concentrations of LPG.

CAUTION — One of the tests described in this document involves the operator inhaling a mixture of air and LPG vapour. Particular attention is drawn to the cautionary statement provided in A.1, where this method is referred to.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 15469, *Petroleum products — Test method for free water in liquefied petroleum gas by visual inspection*

EN 15470, *Liquefied petroleum gases — Determination of dissolved residues — High temperature Gas chromatographic method*

EN 15471, *Liquefied petroleum gases — Determination of dissolved residues — High-temperature gravimetric method*

EN 16423, *Liquefied petroleum gases — Determination of dissolved residue — Gas chromatographic method using liquid, on-column injection*

EN 16942, *Fuels — Identification of vehicle compatibility — Graphical expression for consumer information*

EN 17178:2019, *Liquid petroleum products — Determination of the total volatile sulfur content in liquefied petroleum gases by ultraviolet fluorescence spectroscopy*

EN 27941, *Commercial propane and butane — Analysis by gas chromatography (ISO 7941)*

EN ISO 4256, *Liquefied petroleum gases — Determination of gauge pressure — LPG method (ISO 4256)*

EN ISO 4257, *Liquefied petroleum gases — Method of sampling (ISO 4257)*

EN ISO 4259-2, *Petroleum and related products — Precision of measurement methods and results — Part 2: Interpretation and application of precision data in relation to methods of test (ISO 4259-2)*

EN ISO 6251, *Liquefied petroleum gases — Corrosiveness to copper — Copper strip test (ISO 6251)*

EN ISO 8819, *Liquefied petroleum gases — Detection of hydrogen sulfide — Lead acetate method (ISO 8819)*

EN ISO 8973, *Liquefied petroleum gases — Calculation method for density and vapour pressure (ISO 8973)*

DIN 51619, *Testing of mineral oil hydrocarbons — Determination of the composition of liquid petroleum gases — Gas chromatographic analysis under special consideration of 1,3-butadiene with mass fractions $\leq 0,1$ % (m/m)*

ASTM D6667-14, *Standard Test Method for Determination of Total Volatile Sulfur in Gaseous Hydrocarbons and Liquefied Petroleum Gases by Ultraviolet Fluorescence*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at <https://www.electropedia.org/>

— ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

liquefied petroleum gas

low pressure gas

low pressure liquefied gas of petroleum, synthetic or biological origin that can be stored and/or handled in the liquid phase under moderate conditions of pressure and at ambient temperature, consisting predominantly of propane and butanes, with small proportions of other compounds, including propene, butenes and pentanes/pentenenes

4 Sampling

Samples shall be taken as described in EN ISO 4257 and/or in accordance with the requirements of national standards or regulations for the sampling of automotive LPG. The national requirements shall be set out in detail or shall be referred to by reference in a national annex to this document.

In view of the sensitivity of some of the test methods referred to in this document, particular attention shall be paid to compliance with any guidance on sampling containers which is included in the test method standard.

IMPORTANT — It is important that the sampling procedure is followed in detail in order to avoid evaporation losses.

Before sampling from the dispenser hose, 20 l of product should be pumped or recirculated, in order to obtain a representative sample.

5 Pump marking

Information to be marked on dispensing pumps and nozzles used for delivering automotive LPG, and the dimensions of the label shall be in accordance with EN 16942.

prEN 589:2023 (E)**6 Requirements and test methods****6.1 General**

When tested by the methods of test given in Table 1, automotive LPG fuel shall comply with the limiting requirements specified in that table.

For the minimum vapour pressure, five grades, A, B, C, D and E are given to allow for seasonal limits to be set nationally for each period of the year. In a national annex to this document, each country shall indicate which grade(s) it adopts to achieve a minimum vapour pressure of 200 kPa (gauge) throughout the entire year and shall detail the date range in which the selected grade applies.

Liquefied petroleum gases for automotive purposes shall be free from any adulterant or contaminant that may render the fuel unacceptable for use in appropriate engines.

6.2 Water content

Liquefied petroleum gases for automotive purposes shall not contain free water at 0 °C and at the saturated vapour pressure on visual inspection.

NOTE For propane rich mixtures with a minimum of 60 % (*m/m*) of propane, compliance with EN ISO 13758 [2] equally satisfies this requirement.

For operational purposes it is allowed to add up to 2 000 mg/kg methanol. No other antifreeze agents shall be added.

6.3 Odour

When tested in accordance with the procedure described in Annex A, the odour of the gas shall be characteristic (i.e. distinctive and unpleasant), detectable at a concentration in air of 20 % of the lower flammability limit.

NOTE Unpleasant being subjective, the odour is to be a caution and inviting to the user to search for the leak.

For odour testing, alternative test methods may be used if this detection methods demonstrates the ability to measure the odour and/or a correlated parameter at least equal to that of the test method described in Annex A. Such alternative procedures shall be set out in detail or referred to by reference in a national annex to this document.

6.4 Density

If a density report is required, EN ISO 3993 [3] or EN ISO 8973 are recommended.

6.5 Precision and dispute

6.5.1 All test methods referred to in this document include a precision statement. In cases of dispute, the procedures for resolving the dispute and interpretation of the results based on test method precision, described in EN ISO 4259-2, shall be used.

6.5.2 In case of dispute concerning the evaporation residue, EN 15470 or EN 15471 shall be used.

6.5.3 In case of dispute concerning the vapour pressure, EN ISO 4256 shall be used.

6.5.4 In case of dispute concerning the total diene content and the propane content EN 27941 shall be used.

6.5.5 In cases of dispute concerning total sulfur content, EN 17178 shall be used. See EN 17178:2019, 14.1 for additional information on precision.

Table 1 — Requirements and test methods

Property	Unit	Limits		Test method ^a (See Clause 2, Normative references)
		Minimum	Maximum	
Motor octane number, MON		89,0		Annex B
Total dienes content ⁱ	% (m/m)		0,5	EN 27941 DIN 51619
1,3 Butadiene	% (m/m)		< 0,10	DIN 51619
Propane content ^h	% (m/m)	20		EN 27941 DIN 51619
Hydrogen sulphide		negative		EN ISO 8819
Total sulfur content (after odorization) ⁱ	mg/kg		30	EN 17178 ASTM D6667-14
Copper strip corrosion (1 h at 40 °C)	rating	class 1		EN ISO 6251
Evaporation residue ^b	mg/kg		60	EN 15470 EN 15471 EN 16423
Vapour pressure, gauge at 40 °C ^c	kPa		1 550	EN ISO 4256 EN ISO 8973 and Annex C
Vapour pressure, gauge at a temperature of: ^{d e}	kPa			EN ISO 8973 and Annex C
- grade A: -10 °C		200		
- grade B: -5 °C				
- grade C: 0 °C				
- grade D: +10 °C				
- grade E: +20 °C				
Water content ^f		pass		EN 15469
Odour ^g		unpleasant and distinctive at 20 % LFL		See 6.3 and Annex A

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Property	Unit	Limits		Test method ^a (See Clause 2, Normative references)
		Minimum	Maximum	
a	See also 6.5.1.			
b	See also 6.5.2.			
c	See also 6.5.3.			
d	For the purpose of this standard EN ISO 8973 together with Annex C shall be applied at the indicated temperatures. For internal routine quality control purposes, the values as given in the informative Annex D may also be used.			
e	See also 6.1.			
f	See also 6.2.			
g	National safety requirements have to be followed in any case and may overwrite this standard.			
h	See also 6.5.4.			
i	See also 6.5.5. ASTM D6667-14 is intended to be no longer referenced when sufficient data on EN 17178 is available.			

7 Remarks concerning vehicle application issues like residues in vaporizers or injectors

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The presence of plasticizer additives (e.g. phthalates) in elastomer hoses or other materials which can come into contact with LPG can lead to increased contamination of LPG by high molecular substances. Therefore, great care should be taken by the automotive industry and LPG retailers to avoid such contacts, e.g. by internal coating or introducing materials which do not release those plasticizers.

<https://standards.iteh.ai/catalog/standards/sist/ba491dc9-54fb-44a0-b5c8-1c2878be573f/osist-pren-589-2023>