



**SLOVENSKI STANDARD**  
**SIST EN 589:2004**

**01-november-2004**

**BUXca Yý U**  
**SIST EN 589:2000**

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Automotive fuels - LPG - Requirements and test methods

**iTeh STANDARD PREVIEW**  
Kraftstoffe für Kraftfahrzeuge - Flüssiggas - Anforderungen und Prüfverfahren  
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Carburant pour automobiles - GPL - Exigences et méthodes d'essai

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**Ta slovenski standard je istoveten z: EN 589:2004**

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**ICS:**

75.160.30 Plinska goriva

Gaseous fuels

**SIST EN 589:2004**

**en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 589**

January 2004

ICS 75.160.30

Supersedes EN 589:2000

English version

**Automotive fuels - LPG - Requirements and test methods**

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

Kraftstoffe für Kraftfahrzeuge - Flüssiggas - Anforderungen  
und Prüfverfahren

This European Standard was approved by CEN on 24 December 2003.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document EN 589:2004 has been prepared by Technical Committee CEN/TC 19 "Petroleum products, lubricants and related products", the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2004, and conflicting national standards shall be withdrawn at the latest by July 2004.

This document supersedes EN 589:2000 in whole. In this fourth edition of EN 589 all relevant characteristics, requirements and test methods are specified. Significant technical changes between this European Standard and the previous edition are on:

- requirement of sulfur content
- test method for sulfur
- test method for vapour pressure, including introduction of an additional seasonal grade (E)
- requirement for methanol

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

In this standard Annex A, B and C are normative, Annex D is informative.

## EN 589:2004 (E)

## 1 Scope

This European Standard specifies requirements and test methods for marketed and delivered automotive LPG (Liquefied Petroleum Gas). It is applicable to automotive LPG for use in LPG engine vehicles designed to run on automotive LPG.

NOTE: For the purposes of this European Standard, the term “% (V/V)” is used to represent the volume fraction.

**WARNING - Attention is drawn to the risk of fire and explosion when handling LPG and to the hazard to health which arises 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 European Standard involves the sampling, handling and testing of LPG. All procedures should be conducted away from sources of ignition such as naked flames, unprotected electrical equipment and electrostatic hazards. Testing should be performed as far as practicable under an electrically-safe ventilation hood.

LPG in the liquid form can cause cold burns to the skin. Protective clothing such as gloves and goggles should be worn if contact with the skin is likely to occur.

Unnecessary inhalation of LPG vapour should be avoided. The operator should not be exposed to atmospheres containing more than 1 800 mg/m<sup>3</sup> over an 8 h time-weighted average (TWA) reference period, or more than 2 250 mg/m<sup>3</sup> over a short term, 10 min reference period. One of the tests described in this European Standard 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.

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## 2 Normative references

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This European Standard incorporates by dated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN ISO 3993:1995, *Liquefied petroleum gas and light hydrocarbons - Determination of density or relative density - Pressure hydrometer method (ISO 3993:1995)*.

EN ISO 4256:1998, *Liquefied petroleum gases - Determination of gauge vapour pressure - LPG method. (ISO 4256:1996)*.

EN ISO 4257:2001, *Liquefied petroleum gases - Method of sampling (ISO 4257:2001)*.

EN ISO 4259:1995, *Petroleum products - Determination and application of precision data in relation to methods of test (ISO 4259:1992, including Cor.1: 1993)*.

EN ISO 6251:1998, *Liquefied petroleum gases - Corrosiveness to copper - Copper strip test (ISO 6251:1996)*.

EN ISO 8819:1995, *Liquefied petroleum gases - Detection of hydrogen sulfide - Lead acetate method (ISO 8819:1993)*.

EN ISO 8973:1999, *Liquefied petroleum gases - Calculation method for density and vapour pressure (ISO 8973:1997)*.

EN ISO 13757:1996, *Liquefied petroleum gases - Determination of oily residues - High-temperature method (ISO 13757:1996)*.

EN 24260:1994, *Petroleum products and hydrocarbons - Determination of sulfur content - Wickbold combustion method (ISO 4260:1987)*.

EN 27941:1993, *Commercial propane and butane - Analysis by gas chromatography (ISO 7941:1988)*.

ASTM D 3246:96, *Standard test method for sulfur in petroleum gas by oxidative microcoulometry*.

ASTM D 6667:01, *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 European Standard, the following term and definition apply.

#### 3.1

##### liquefied petroleum gas

##### LPG

petroleum gas which can be stored and/or handled in the liquid phase under moderate conditions of pressure and at ambient temperature, consisting predominantly of propane, butanes, with small proportions of propene, butenes and pentanes/pentenes

### 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 European Standard.

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

NOTE 1 It is important that the sampling procedure is followed in detail in order to avoid evaporation losses.

NOTE 2 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 used for delivering automotive LPG, and the dimensions of the mark shall be in accordance with the requirements of national standards or regulations for the marking of pumps for automotive LPG. Such requirements shall be set out in detail or shall be referred to by reference in a national annex to this European Standard.

### 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 European Standard, each country shall indicate which grade(s) it adopts to achieve a minimum vapour pressure of 150 kPa (gauge) throughout the entire year and shall detail the date range in which the selected grade applies.

Table 1 - Requirements and test methods

Property	Unit	Limits		Test method <sup>a</sup> (See 2. Normative references)
		Minimum	Maximum	
Motor octane number, MON		89,0		Annex B
Total dienes content (including 1.3 butadiene)	mole %		0,5	EN 27941
Hydrogen sulfide		negative		EN ISO 8819
Total sulfur content <sup>b</sup> (after stenching)	mg/kg		50	EN 24260 ASTM D 3246 ASTM D 6667
Copper strip corrosion (1 h at 40 °C)	rating		class 1	EN ISO 6251
Evaporation residue	mg/kg		100	EN ISO 13757
Vapour pressure, gauge, at 40 °C <sup>c</sup>	kPa		1 550	EN ISO 4256 EN ISO 8973 and Annex C
Vapour pressure, gauge, min. 150 kPa at a temperature of <sup>d, e</sup> - for grade A - for grade B - for grade C - for grade D - for grade E	°C		- 10 - 5 0 + 10 + 20	EN ISO 8973 and Annex C
Water content		No free water at 0 °C		See 6.2
Odour		Unpleasant and distinctive at 20 % LFL		See 6.3 and Annex A
<sup>a</sup> See also 6.5.1. <sup>b</sup> See also 6.5.2. <sup>c</sup> See also 6.5.3. <sup>d</sup> 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. <sup>e</sup> See also 6.1				

## 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 1 For propane rich mixtures with a minimum of 60 % propane, compliance with EN ISO 13758 [1] equally satisfies this requirement.

NOTE 2 For this purpose the equipment as described in EN ISO 3993 may be used.

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 (LFL).

### 6.4 Density

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

### 6.5 Precision and dispute

**6.5.1** All test methods referred to in this European Standard 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, shall be used.

**6.5.2** In cases of dispute concerning the total sulfur content, ASTM D 6667 shall be used.

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

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