

SLOVENSKI STANDARD SIST EN 228:2012+A1:2017

01-november-2017

Goriva za motorna vozila - Neosvinčeni motorni bencini - Zahteve in preskusne metode

Automotive fuels - Unleaded petrol - Requirements and test methods

Kraftstoffe für Kraftfahrzeuge - Unverbleite Ottokraftstoffe - Anforderungen und Prüfverfahren

iTeh STANDARD PREVIEW

Carburants pour automobiles - Essence sans plomb - Exigences et méthodes d'essai

Ta slovenski standard je istoveten z: https://standards.iten.av/catalog/standards/sist/41000442-898e-4438-9793-

da07476e863f/sist-en-228-2012a1-2017

ICS:

75.160.20 Tekoča goriva

Liquid fuels

SIST EN 228:2012+A1:2017

en,fr,de

iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>SIST EN 228:2012+A1:2017</u> https://standards.iteh.ai/catalog/standards/sist/4fd00a42-898e-4a58-9793da07476e863f/sist-en-228-2012a1-2017

SIST EN 228:2012+A1:2017

EUROPEAN STANDARD NORME EUROPÉENNE **EUROPÄISCHE NORM**

EN 228:2012+A1

May 2017

ICS 75.160.20

Supersedes EN 228:2012

English Version

Automotive fuels - Unleaded petrol - Requirements and test methods

Carburants pour automobiles - Essence sans plomb -Exigences et méthodes d'essai

Kraftstoffe für Kraftfahrzeuge - Unverbleite Ottokraftstoffe - Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 1 September 2012 and includes Amendment 1 approved by CEN on 17 March 2017.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions. Standards.iteh.ai)

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portúgal, Rómania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom."

da07476e863f/sist-en-228-2012a1-2017



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

SIST EN 228:2012+A1:2017

EN 228:2012+A1:2017 (E)

Contents

European foreword				
1	Scope	5		
2	Normative references	5		
3	Sampling	7		
4	Pump marking	7		
5	Requirements and test methods	7		
5.1	A) Bio-components (A1	7		
5.2	Dyes and markers			
5.3	Additives			
5.4	Generally applicable requirements and test methods	8		
5.5	Climatically dependent requirements and test methods			
5.6	Octane reporting			
5.7	Precision and dispute			
Annex A (normative) Vapour pressure waiver				
A.1	Vapour pressure waiver permitted			
A.2	Guidance for checking compliance with the permitted waiver			
BibliographySIST EN 228:2012+A1:2017				
	https://standards.iteh.ai/catalog/standards/sist/4td00a42-898e-4a58-9793-			
	dau/4/be8b31/sist-en-228-2012a1-201/			

European foreword

This document (EN 228:2012+A1:2017) 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 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 November 2017, and conflicting national standards shall be withdrawn at the latest by November 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes A EN 228:2012 (A).

This document includes Amendment 1 approved by CEN on 17 March 2017.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A_1 A_1 .

This document was originally prepared under a mandate given to CEN by the European Commission and the European Free Trade Association. In addition to other standards, it is intended to be complementary to the regulatory measures contained in various EU Directives.

(standards.iteh.ai) The following is a list of significant technical changes between this European Standard and the previous edition:

SIST EN 228:2012+A1:2017

- https://standards.iteh.ai/catalog/standards/sist/4fd00a42-898e-4a58-9793 New requirements following/amendment_2009/30/EC [3], 2011/63/EU [4] and 2014/77/EU [11] to the European Fuels Quality Directive 98/70/EC [1], are taken into account. A Tables 1, 2, 3, 4 and A.1 explicitly differentiate between requirements included in the European Fuels Directive 98/70/EC [1], including subsequent Amendments [2], [3] and [4], and other requirements.
- Specific requirements concerning the limitation of use of methylcyclopentadienyl manganese tricarbonyl (MMT) as required by the EC have been incorporated.
- As the introduction of 10 % (V/V) of ethanol in unleaded petrol has an impact on refinery and blending processes, an update of the distillation characteristics has been considered and a new Table 3 with slightly adapted volatility classes (E70, E100 and VLI) has been introduced. Work is still ongoing to generate data that would support the idea that these changes do not affect cold starting and hot weather driveability aspects of the vehicles. These updates have been agreed upon with precaution and might be revised depending on fuel-related issues in the market.
- Further specification is given, by including separate tables on unleaded petrol grade for older vehicles that are not warranted to use unleaded petrol with a high biofuel content. A CEN/TR aiming at giving guidance on oxygenate blending has been prepared in parallel [5].
- Further clarification on how to determine the vapour pressure waiver for unleaded petrol containing ethanol, allowed on the market under exemption circumstances, is given in Annex A. The exact number of decimal points for the waiver has been clarified [4].
- Several new or revised test methods have been introduced. The European Fuels Directive 98/70/EC [1], including its Amendments [2] [3] [4], [A] [11] (A] refers to test methods in

EN 228:2004, with the requirement that updated analytical methods shall be shown to give at least the same accuracy and at least the same precision as the methods they replace.

- Removal of the allowance for 50 mg/kg sulfur content.
- Reference to the revised ethanol specification EN 15376.

A) The marking at the pump of this product is in line with the requirements of the Fuels Quality Directive and the Alternative Fuels Infrastructure Directive [12]. (A)

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

iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>SIST EN 228:2012+A1:2017</u> https://standards.iteh.ai/catalog/standards/sist/4fd00a42-898e-4a58-9793da07476e863f/sist-en-228-2012a1-2017

1 Scope

This European Standard specifies requirements and test methods for marketed and delivered unleaded petrol. It is applicable to unleaded petrol for use in petrol engine vehicles designed to run on unleaded petrol.

This European Standard specifies two types of unleaded petrol: one type with a maximum oxygen content of 3,7 % (m/m) and a maximum ethanol content of 10,0 % (V/V) in Table 1, and one type intended for older vehicles that are not warranted to use unleaded petrol with a high biofuel content, with a maximum oxygen content of 2,7 % (m/m) and a maximum ethanol content of 5,0 % (V/V) in Table 2.

NOTE 2 For the purposes of this European Standard, the terms "% (m/m)" and "% (V/V)" are used to represent respectively the mass fraction, μ , and the volume fraction, φ .

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 237:2004, Liquid petroleum products — Petrol — Determination of low lead concentrations by atomic absorption spectrometry (standards.iteh.ai)

da07476e863f/sist-en-228-2012a1-2017

(A) EN 1601:2014^{1,} Liquid petroleum products — Unleaded petrol — Determination of organic oxygenate compounds and total organically bound oxygen content by gas chromatography (O-FID) (A)

EN 12177:1998, Liquid petroleum products — Unleaded petrol — Determination of benzene content by gas chromatography

 \square EN 13016-1:2007¹, Liquid petroleum products — Vapour pressure — Part 1: Determination of air saturated vapour pressure (ASVP) and calculated dry vapour pressure equivalent (DVPE) \square

EN 13132:2000, Liquid petroleum products — Unleaded petrol - Determination of organic oxygenate compounds and total organically bound oxygen content by gas chromatography using column switching

A EN 14275:2013, Automotive fuels — Assessment of petrol and diesel fuel quality — Sampling from retail site pumps and commercial site fuel dispensers (A)

A) EN 15376:2014, Automotive fuels — Ethanol as a blending component for petrol — Requirements and test methods (A)

EN 15553:2007, Petroleum products and related materials — Determination of hydrocarbon types - Fluorescent indicator adsorption method

¹ Under revision.

EN 228:2012+A1:2017 (E)

EN 16135:2011, Automotive fuels — Determination of manganese content in unleaded petrol — Flame atomic absorption spectrometric method (FAAS)

 \square EN 16136:2015, Automotive fuels — Determination of manganese content in unleaded petrol — Inductively coupled plasma optical emission spectrometry (ICP OES) method \square

A) EN 16942:2016, Fuels – Identification of vehicle compatibility – Graphical expression for consumer information (A)

EN ISO 2160:1998, Petroleum products — Corrosiveness to copper — Copper strip test (ISO 2160:1998)

EN ISO 3170:2004, Petroleum liquids — Manual sampling (ISO 3170:2004)

EN ISO 3171:1999, Petroleum liquids — Automatic pipeline sampling (ISO 3171:1988)

(A) EN ISO $3405:2011^1$, Petroleum products — Determination of distillation characteristics at atmospheric pressure (ISO 3405:2011) (A)

EN ISO 3675:1998, Crude petroleum and liquid petroleum products — Laboratory determination of density — Hydrometer method (ISO 3675:1998)

 \square EN ISO 4259:2006¹, Petroleum products — Determination and application of precision data in relation to methods of test (ISO 4259:2006) \square

The STANDARD PREVIEW (A) EN ISO 5163:2014, Petroleum products — Determination of knock characteristics of motor and aviation fuels — Motor method (ISO 5163:2014) (A) ards.iteh.ai)

A) EN ISO 5164:2014¹, Petroleum products_{STST} <u>Determination</u> of knock characteristics of motor fuels — Research method (ISO 5164:2014). (A) rds. iteh. ai/catalog/standards/sist/4fd00a42-898e-4a58-9793-

da07476e863f/sist-en-228-2012a1-2017

 \square EN ISO 6246:2017, Petroleum products — Gum content of light and middle distillate fuels — Jet evaporation method (ISO 6246:2017) \square

EN ISO 7536:1996, Petroleum products — Determination of oxidation stability of gasoline — Induction period method (ISO 7536:1994)

(A) EN ISO 12185:1996¹, Crude petroleum and petroleum products — Determination of density — Oscillating U-tube method (ISO 12185:1996) (A)

EN ISO 13032:2012, Petroleum products — Determination of low concentration of sulfur in automotive fuels — Energy-dispersive X-ray fluorescence spectrometric method (ISO 13032:2012)

EN ISO 20846:2011, Petroleum products — Determination of sulfur content of automotive fuels — Ultraviolet fluorescence method (ISO 20846:2011)

EN ISO 20884:2011, Petroleum products — Determination of sulfur content of automotive fuels — Wavelength-dispersive X-ray fluorescence spectrometry (ISO 20884:2011)

(A) EN ISO 22854:2016, Liquid petroleum products - Determination of hydrocarbon types and oxygenates in automotive-motor gasoline and in ethanol (E85) automotive fuel - Multidimensional gas chromatography method (ISO 22854:2016) (A)

3 Sampling

Samples shall be taken as described in EN ISO 3170 or EN ISO 3171 and/or in accordance with the requirements of national standards or regulations for the sampling of unleaded petrol. 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.

It is essential that for sampling of unleaded petrol the containers used to take and store the samples before testing are not contaminated, especially with lead and/or sulfur.

4 Pump marking

A) Information to be marked on dispensing pumps and nozzles used for delivering unleaded petrol, and the dimensions of the mark shall be in accordance with EN 16942.

Labelling shall be clearly visible, easily legible and displayed at any point where unleaded petrol with metallic additives is made available to consumers. The label shall contain: "Contains metallic additives" in the national language(s) and shall be laid down in the National Annex to this document.

A1) Deleted text. (A1

A) It is also recommended that additional pump marking be applied to specify the RON supplied. (A)

(standards.iteh.ai)

5 Requirements and test methods

SIST EN 228:2012+A1:2017

5.1 A) Bio-components (A) itch ai/catalog/standards/sist/4fd00a42-898e-4a58-9793-

da07476e863f/sist-en-228-2012a1-2017

5.1.1 A1 Ethanol (A1

Unleaded petrol may contain up to 10,0 % (*V*/*V*) of ethanol complying with EN 15376.

When ethanol is used as a blending component, it may contain denaturants, if required by European and national regulations. These denaturants are permitted provided they do not cause harmful side effects to vehicles and fuel distribution systems.

NOTE Further advice on handling and blending oxygenates in general can be found in [6]. Further guidance on blending oxygenates in accordance with the requirements of 2009/30/EC is given in CEN/TR 16435 [5].

A traceable record of biological origin is recommended. For the determination of biological origin of ethanol, an alternative is age determination, which is based on the beta(minus) decay of the radioactive carbon isotope C 14. This method [9] is considered too laborious for frequent testing, but it may be considered a useful tool to determine cases where the audit trail approach is contested.

5.1.2 A) Other (bio-)components

Limits for adding ethanol and other oxygenates as listed in Table1 and Table 2 do not apply to other hydrocarbons, such as synthetic hydrocarbons, and other renewable² hydrocarbons, since these components are allowed in any proportions provided that the final blend complies with the

² For clarification of renewable, see [13].

EN 228:2012+A1:2017 (E)

requirements of EN 228. The co-processing of renewable feedstock at refineries is also allowed provided that the final fuel meets the requirements of EN 228. (A)

5.2 Dyes and markers

The use of dyes and markers is allowed provided they do not cause harmful side effects to vehicle and fuel distribution systems.

5.3 Additives

5.3.1 General

In order to improve performance quality, the use of additives is allowed. Suitable fuel additives without known harmful side effects are recommended in the appropriate amount to help avoid deterioration of driveability and emissions control durability. Other technical means with equivalent effects may also be used.

$|A_1\rangle$ Deleted text. $\langle A_1$

NOTE Deposit forming tendency test methods suitable for routine control purposes have not yet been identified and developed.

5.3.2 Phosphorus

In order to protect automotive catalyst systems, compounds containing phosphorus shall not be added to unleaded petrol.

5.3.3 Methylcyclopentadienyl Manganese Tricarbonyl (MMT)-ai)

When methylcyclopentadienyl manganese <u>tricarbonyl2(MMT)2is</u> used, a specific labelling is required (see Clause 4). https://standards.iteh.ai/catalog/standards/sist/4fd00a42-898e-4a58-9793-

da07476e863f/sist-en-228-2012a1-2017 MMT is a metallic additive that may be used in unleaded petrol.

A₁ Deleted text. (A₁

5.4 Generally applicable requirements and test methods

When tested by the methods indicated in Tables 1, 2, 3 and 4, unleaded petrol, according to its maximum oxygen content, shall be in accordance with the limits specified respectively in Tables 1 and 3, or 2 and 4.

Member States may decide to continue to permit the placing on the market of unleaded regular grade petrol. This separate grade needs to conform to all requirements set out in Tables 1, 2 3 and 4 of this European Standard with the exception of a minimum motor octane number (MON) of 81 and a minimum research octane number (RON) of 91. The requirements and test methods are then to be laid down in a National Annex to this document.

Methods of test included as normative references in this European Standard, when updated, shall give at least the same accuracy and at least the same level of precision as the methods they replace.

(A) Unleaded petrol shall be free from any adulterant or contaminant that can render the fuel unacceptable for use in petrol engine vehicles designed to run on unleaded petrol. (A)

NOTE For further information on preventing contamination in the supply chain or for cross-contamination it is advisable to check CEN/TR 15367, Parts 2 and 3 respectively [7, 8]. A determination method for high boiling components in unleaded petrol is being under development by CEN.

EN 228:2012+A1:2017 (E)

01 5,7 % (//////)							
Property	Units	Limits		Test Method a			
		Min Max		(See 2. Normative			
				references)			
Research octane number, RON		95,0		EN ISO 5164 ^b			
Motor octane number, MON		85,0		EN ISO 5163 ^b			
Lead content	mg/l		5,0	EN 237			
Density (at 15 °C) °	kg/m ³	720,0	775,0	EN ISO 3675 EN ISO 12185			
Sulfur content ^c	mg/kg		10,0	EN ISO 13032 EN ISO 20846 EN ISO 20884			
Manganese content ^d		A1) Deleted text. (A1	A1) Deleted text. (A1	EN 16135			
A1) Deleted text. (A1	mg/l		2,0	EN 16136			
Oxidation stability	minutes	360		EN ISO 7536			
Existent gum content (solvent washed)	mg/100 ml		5	EN ISO 6246			
Copper strip corrosion (3 h at 50 °C)	rating	class 1		EN ISO 2160			
Appearance ^e		clear and bright		Visual inspection			
Hydrocarbon type content ^c - olefins	SMARI	DARD PRE		EN 15553 EN ISO 22854			
- aromatics	(stand	ards.i t eh.ai	35,0				
Benzene content ^c	% (V/V)		1,00	EN 238			
https://standards	<u>SIST EN</u> sitebai/catalog/	<u>228:2012+A1:2017</u> standards/sist/4fd00a42-8	98e-4a58-9793-	EN 12177 EN ISO 22854			
Oxygen content ^{c, i}	d ‰7(m∕/m) 3f	sist-en-228 -2 012a1-201	7 3,7	EN 1601 EN 13132 EN ISO 22854			
Oxygenates content ^c	% (V/V)			EN 1601			
- methanol ^f			3.0	EN 13132			
- ethanol ^g			10,0	EN ISO 22854			
- iso-propyl alcohol			12,0				
- iso-butyl alcohol			15,0				
- tert-butyl alcohol			15,0				
- ethers (5 or more C atoms)			22,0				
- other oxygenates ^h			15,0				

Table 1 — Requirements and test methods for unleaded petrol with a maximum oxygen content of 3,7 % (m/m)

NOTE Requirements in bold refer to the European Fuels Directive 98/70/EC [1], including subsequent Amendments [2], [3], [4] and [11].

^a See also 5.7.1.

b A correction of 0,2 for MON and RON shall be subtracted for the calculation of the final result, before reporting according to the requirement of the European Fuels Directive 98/70/EC [1], including subsequent Amendments [2], [3], [4] and [11]. (A See also 5.6 and 5.7.2.

See also 5.7.2.

^d See also 5.3.3.

^e Appearance shall be determined at ambient temperature.

^f Stabilising agents shall be added.

^g Ethanol when used as a blending component shall conform to EN 15376 (see 5.1). Stabilising agents may be added.

^h Other mono-alcohols and ethers with a final boiling point no higher than prescribed in Table 3.

A EN 13131 contains no precision statement for an oxygen content above 3 % (m/m). Based on the round robin data from the last six years, CEN/TC 19 accepts an average reproducibility value of R = 0.37 for all test methods.