SLOVENSKI STANDARD
SIST-TP CEN/TR 15993:2018

01-junij-2018

Nadomešča:
SIST-TP CEN/TR 15993:2013

Goriva za motorna vozila - Gorivo etanol (E85) za motorna vozila - Ozadje zahtevanih parametrov, njihovih omejitev in določevanj

Automotive fuels - Ethanol (E85) automotive fuel - Background to the parameters required and their respective limits and determination

Kraftstoffe für Kraftfahrzeuge - Ethanol (E85) Fahrzeugkraftstoff - Hintergrund über die geforderten Parameter und ihre entsprechenden Grenzen und Bestimmung

Carburants pour automobiles - Ethanol (E85) carburants pour automobiles - Historique sur la définition des paramètres requis, de leurs limites et de leur détermination respectives

Ta slovenski standard je istoveten z: **CEN/TR 15993:2018**

ICS:

71.080.60	Alkoholi. Etri	Alcohols. Ethers
75.160.20	Tekoča goriva	Liquid fuels

SIST-TP CEN/TR 15993:2018 **en**

TECHNICAL REPORT

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

CEN/TR 15993

March 2018

ICS 75.160.20; 71.080.60

Supersedes CEN/TR 15993:2013

English Version

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This Technical Report was approved by CEN on 8 February 2018. It has been drawn up by the Technical Committee CEN/TC 19.

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Ref. No. CEN/TR 15993:2018 E

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European foreword

This document (CEN/TR 15993:2018) 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.

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

This document supersedes CEN/TR 15993:2013.

The original Technical Report presented all decisions that led to CEN/TS 15293:2011 [1], when it was developed from its predecessor [2]. This document now includes all decisions that have been made within the Ethanol Fuel Task Force since 2011, following comments and further investigations leading to the draft ethanol (E85) automotive fuel specification as a proposed European Standard prEN 15293:2017.

1 Scope

This Technical Report explains the requirements and test methods for marketed and delivered ethanol (E85) automotive fuel according to EN 15293. It provides background information on the final text of the draft European standard and gives guidance and explanations to the producers, blenders, marketers and users of ethanol (E85) automotive fuel.

It is applicable to ethanol (E85) for use in spark ignition engine vehicles designed to run on ethanol (E85). Ethanol (E85) is a mixture of nominally 85 % ethanol and 15 % petrol, but it also includes the possibility of having different 'seasonal grades' containing 50 % or more ethanol.

NOTE 1 This document is directly related to prEN 15293:2017 and will be updated if further revisions to the standard take place.

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

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 228, *Automotive fuels — Unleaded petrol — Requirements and test methods*

EN 1601:1997, *Liquid petroleum products — Unleaded petrol — Determination of organic oxygenate compounds and total organically bound oxygen content by gas chromatography (O-FID)*

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

EN 13016-3, *Liquid petroleum products — Vapour pressure — Part 3: Determination of vapour pressure and calculated dry vapour pressure equivalent (DVPE) (Triple Expansion Method)*

CEN/TS 15293:2011, *Automotive fuels — Ethanol (E85) automotive fuel — Requirements and test methods*

prEN 15293:2017, *Automotive fuels — Ethanol (E85) automotive fuel — Requirements and test methods*

EN 15376, *Automotive fuels — Ethanol as a blending component for petrol —Requirements and test methods*

EN 15485, *Ethanol as a blending component for petrol — Determination of sulfur content — Wavelength dispersive X-ray fluorescence spectrometric method*

EN 15486, *Ethanol as a blending component for petrol — Determination of sulfur content — Ultraviolet fluorescence method*

EN 15487, *Ethanol as a blending component for petrol — Determination of phosphorus content — Ammonium molybdate spectrometric method*

EN 15488, *Ethanol as a blending component for petrol — Determination of copper content — Graphite furnace atomic absorption spectrometric method*

EN 15489, *Ethanol as a blending component for petrol — Determination of water content — Karl Fischer coulometric titration method*

EN 15490, *Ethanol as a blending component for petrol — Determination of pHe*

EN 15491, *Ethanol as a blending component for petrol — Determination of total acidity — Colour indicator titration method*

EN 15492, *Ethanol as a blending component for petrol — Determination of inorganic chloride and sulfate content — Ion chromatographic method*

EN 15691:2009, *Ethanol as a blending component for petrol — Determination of dry residue (involatile material) — Gravimetric method*

EN 15692:2009, *Ethanol as a blending component for petrol — Determination of water content — Karl Fischer potentiometric titration method*

EN 15721:2013, *Ethanol as a blending component for petrol — Determination of higher alcohols, methanol and other impurities — Gas chromatographic method*

EN 15769, *Ethanol as a blending component of petrol — Determination of appearance — Visual method*

EN 16270:2015, *Automotive fuels — Determination of high-boiling components including fatty acid methyl esters in petrol and ethanol (E85) automotive fuel — Gas chromatographic method*

EN 16761-1, *Automotive fuels — Determination of methanol in automotive ethanol (E85) fuel by gas chromatography — Part 1: Method using single column technique*

EN 16761-2, *Automotive fuels — Determination of methanol in automotive ethanol (E85) fuel by gas chromatography —Part 2: Method using heart cut technique*

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

EN ISO 3405:2000, *Petroleum products — Determination of distillation characteristics at atmospheric pressure (ISO 3405:2000)*

EN ISO 5163, *Petroleum products — Determination of knock characteristics of motor and aviation fuels — Motor method (ISO 5163)*

EN ISO 5164, *Petroleum products — Determination of knock characteristics of motor fuels — Research method (ISO 5164)*

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

EN ISO 12185, *Crude petroleum and petroleum products — Determination of density — Oscillating U-tube method (ISO 12185)*

EN ISO 22854, *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)*

3 Summary

The European Commission is promoting the increased use of renewable energy and, as part of this policy, is encouraging the use of ethanol as a blend component with gasoline.

For ethanol itself, a European Standard, EN 15376, was published in 2011, and this was developed further into a standard for ethanol suitable for blending at all levels up to 85 % in gasoline (2014 publication).

For ethanol (E85) automotive fuel, the standardization activity began with the creation of a CEN Workshop Agreement (CWA). This was developed subsequently by the Task Force (E85) into a CEN Technical Specification, positively balloted by the end of 2010 (CEN/TS 15293).

The Ethanol Fuel Task Force (EFTF) was formed by CEN in 2011, and combined the activities of TF E85 and the existing Ethanol Task Force. EFTF was mandated to develop the Technical Specification for E85 into a full European Standard.

The test methods have been examined by the experts in the task forces to ensure their applicability to E85 fuel and to determine if their precision is sufficient to support the limit values proposed. This activity was supported by work in several other CEN working groups where the specialists in particular methods are present.

All parameters were reviewed in terms of their need to be in the specification, and their limit values re-assessed to fit with current needs. Parameters have been added or removed accordingly. Improved methods have been developed, and some discontinued that did not meet the precision requirements.

Automotive ethanol (E85) automotive fuel is constituted from a mixture of ethanol complying to EN 15376 and of regular market petrol product. The latter either complies to EN 228 or is a Blending Oxygenate Base-stock (BOB) that fulfils EN 228 after addition of ethanol. The need for a particular parameter to be part of the E85 specification has taken account of those parameters in the ethanol and gasoline specifications.

This document is the report on the technical work to date carried out by the TF E85 (see 5.1) and subsequently the EFTF (see 5.2) towards establishing a European Standard for ethanol (E85) automotive fuel.

4 Historical context

The European Commission is following a policy of promoting renewable energy use in Europe, and to this end is encouraging the extension of automotive gasoline fuel with a proportion of renewably-sourced ethyl alcohol (referred to in this document as ethanol).

In order to facilitate a transparent and stable market in ethanol, it is necessary to establish an ethanol (E85) automotive fuel standard for Europe that will ensure a uniform high quality fuel for problem-free use as a gasoline fuel for FFV engines.

In anticipation of a mandate from the Commission, in 2007 the Comité Européen de Normalization (CEN) Technical Committee 19, responsible for Automotive Fuels Standards, accepted the CEN Workshop Agreement (CWA) revision as a work item on its programme to be developed in Working Group 21, responsible for Automotive Gasoline management.

The intention of CEN/TC 19 was to develop CWA 15293 through to a European Standard, based on the publication of EN 15376 for ethanol and EN 228 for gasoline, also taking into account the developments in Sweden, France and Germany. Discussion in WG 21 had indicated that there were still test method questions to be solved and thus national initiatives were not halted.

Initial planning was for enquiry text to be ready in August 2008, and the final text to be delivered in November 2009. WG 21 had advised the use of EN 228 as the blending component and had supported a

six month extension allowance for the E85 specification for the necessary updating of test methods and seasonal grades. prEN 15293 was published for ballot in May 2009.

The TF 85, however, had encountered several open issues due to the uncertainty of octane guarantee in the future with the integration of Blending Oxygenate Base-stock (BOB) in all European markets and its impact on ethanol (E85) automotive fuels. In addition, the test methods' precision for chlorine content at 1 mg/kg or below and the high-boiler requirement, had been under evaluation. Further time was required to collect data on the current market, resulting in a better specification proposal. At the end of 2009, TF 85 still planned to aim at a submission for formal vote halfway through 2010. After the CEN enquiry, considering the technical comments and the suggested necessary updates, the deliverable on prEN 15293 had been changed into a CEN Technical Specification with its submission to CEN/CCMC in March 2010.

CEN/TS 15293 was ratified by CEN on 28th September 2010 and was published as CEN/TS 15293:2011.

The EFTF was formed in 2011 at the request of WG 21, and combined the work programmes on ethanol and on E85. The mandate from WG 21 was:

a) to revise the Ethanol standard EN 15376 to be applicable to ethanol for blending at all levels up to and including 85 %

b) to develop the CEN Technical Specification CEN/TS 15293 to a full European standard

The Ethanol European standard was duly revised and published as EN 15376:2014.

For E85, work within the EFTF commenced in 2011 to develop CEN/TS 15293 into a full European standard. After significant work within the EFTF, and with the help of WG9 and WG 27, the meeting of WG 21 in November 2014 approved the process of progressing to full EN standard. A NWI proposal was prepared and balloted with a positive result (16 in favour, 1 against).

A draft text for prEN 15293 was submitted for Enquiry Vote in February 2016. The proposed text was rejected, mainly as a consequence of confusion and concerns around the topic of deposits/sulfate (see 6.2.14). WG 21 requested further clarification in June 2016, and a great deal more work was done in this area. In February 2017, WG 21 agreed to progress to a second EV which commenced in June 2017.

5 Task Forces

5.1 The Ethanol (E85) automotive fuel Task Force

CEN requested TC 19/WG 21 to convene a task force and begin work on a draft ethanol (E85) automotive fuel standard. A call was made to the industries concerned by the mandate for experts to participate in the TF E85. The experts who have contributed to the work are listed in Table 1.

Table 1 — Membership of the Task Force (E85)

Name	Organization	Country
Auger Celine (from meetings 2 to 9)	Renault	France
Baldini Luca	ENI	Italy
Bennett John	Afton Chemical	United Kingdom
Bernard Joerg	Südzucker	Germany
Betlejewski Marek (from meetings 2 to 7)	PKN Orlen	Poland
Colbert Dane	Ethanol Union	France

Name	Organization	Country
Costenoble Ortwin (TF Secretary)	NEN	Netherlands
Crépeau Gerald (Convenor)	PSA Peugeot Citroën	France
Elliott Nigel	Exxon Mobil	United Kingdom
Engelen Benoit	Total	Belgium
Feuerhelm Tom	DIN/FAM	Germany
Gameson Thomas	Abengoa Bioenergia	Spain
Gibarroux Germain (since meeting 10)	Renault	France
Grand Jean-Gabriel (until meeting 2)	Renault	France
Hermans Pierre (until meeting 10)	Exxonmobil	Belgium
Jeuland Nicolas (since meeting 5)	IFP	France
King Stan (until meeting 9)	Afton Chemical	CEFIC-ATC
Koppen Piet (since meeting 8)	PAC	Netherlands
Kronström Börje	Svenska Shell	Sweden
Lloyd Robin (until meeting 4)	Argent Energy	United Kingdom
Leber Edwin (until meeting 8)	Opel	Germany
Manuelli Pascal	Total	France
Mirabella Walter	Lyondell	Italy
Nilsson Magnus (until meeting 10)	General Motors Powertrain	Sweden
Olofsson Mathias (until meeting 10)	SEKAB	Sweden
Pollak Vanda (since meeting 6)	Hungrana	Hungary
Rantanen – Kolehmainen Leena (since meeting 6)	Nesteoil	Finland
Rappange Aly (until meeting 10)	Royal Nedalco	Netherlands
Saunders Bob (since meeting 8)	EI	United Kingdom
Schuermans Kurt (since meeting 7)	Chevron	Netherlands
Sijben Jo (from meetings 4 to 10)	Process Design Center	Netherlands
Skret Iwona (until meeting 6)	Instytut Technologii Nafty	Poland
Sniegula Agnieska (since meeting 8)	PKN Orlen	Poland
Spaans Han (until meeting 9)	AC Analytical Controls	Netherlands
Tittarelli Paolo	SSC	Italy

The task force has met on the following occasions:

1) 30th October 2007 Brussels, 1st meeting
2) 15th January 2008 Brussels, 2nd meeting
3) 5th March 2008 Hamburg, 3rd meeting
4) 18th April 2008 London, 4th meeting
5) 3rd July 2008 Brussels, 5th meeting
6) 11th September 2008 Brussels, 6th meeting
7) 4th/5th December 2008 Paris, 7th meeting
8) 23rd April 2009 Paris, 8th meeting
9) 23rd September 2009 Paris, 9th meeting
10) 18th February 2010 Brussels, 10th meeting

TF 85 Convenor for 1st and 2nd meetings was John Bennett. Convenor for subsequent meetings was Gerald Crépeau. Following the finalisation of the ethanol specification at the level of 10 % blending, it was decided to merge the TF 85 with the Ethanol TF. At the end of 2010, both taskforces were disbanded.

5.2 The Ethanol Fuel Task Force

CEN combined the work of the Ethanol and E85 task forces in 2011 and formed an Ethanol Fuel Task Force (EFTF). The EFTF worked on the revision of the EN 15376 Ethanol standard, and the development of the E85 CEN/TS 15293 to full European standard. The experts involved in this combined task force were mainly those who participated in the previous task forces. The experts that have contributed to the work since 2011 are listed in Table 2 (those no longer active in italics). EFTF Convenor has been Phil Davison al this time.

Table 2 — Membership of the EFTF

Name	Organization	Country
Andersson Jan-Erik	Lantmannen	Sweden
Baldini Luca	ENI	Italy
Barahona Maria Ascension	Ecocarburantes	Spain
Bennett John	Afton Chemical	UK
Bernabeu Victor	ePURE	Liaison
Bernard Joerg	Suedzuecker	Germany
Bontoft Carole	Exxon Mobil	UK
Burrows Aubrey	Downstream Fuels Association	UK
Burton Jerry	Downstream Fuels Association	UK
Catalano Salvatore	SGS Italia	Italy

Name	Organization	Country
Chatzigakis Alexandros	Helpe	Greece
Costenoble Ortwin	NEN	TF Secretary
Crépeau Gerald	PSA Peugeot Citroën	France
Davison Phillip (Convenor)	Davison Consultants	UK
Desplechin Emmanuel	ePURE	Liaison
Di Giorgio, Laura	Q8	Italy
Engelen Benoit	Total	Belgium
Faedo Davide	SSC	Italy
Feuerhelm Tom	DIN/FAM	Germany
Fiolet Gerard	Shell	Netherlands
Fischer Juergen	DIN/FAM	Germany
Gameson Thomas	Abengoa Bioenergia	Spain
Garcia Eduardo	Abengoa Bioenergia	Spain
Gibarroux Germain	Renault	France
Gynnerstedt Magnus	Scania	Sweden
Jackson Alistair	Exxon Mobil	UK
Jacobsson Lisa	Volvo Cars	Sweden
Jacquelin Paul	Tereos	France
Jeuland Nicolas	IFP	France
Karvo Anna	Neste	Finland
Kehoe Charlotte	BP	Germany
Kemppi Ida-Kaisa	NEOT	Finland
Keuken Hans	Process Design Center	Netherlands
Koppen Piet	PAC	Netherlands
Kouwenhoven Lenny	PAC	Netherlands
Kronström Börje	St1 Sverige AB	Sweden
Kuenne Henning	VW	Germany
Kurtsoglou Nicolas	SNPAA	France
Lemahieu Hendrik	Belgian Bioethanol Association	Belgium
Lois Evripidis	*Technical University Athens*	*Greece*
Manuelli Pascal	Total	France
Mirabella Walter	LyondellBasell	Italy
Papachristou Charaklia	*Hellenic Petroleum*	*Greece*
Pollak Vanda	Hungrana	Hungary