SLOVENSKI STANDARD
SIST EN 15195:2007

01-junij-2007

Tekoči naftni proizvodi – Ugotavljanje zakasnitve vžiga in izpeljanega cetanskega števila (DCN) v srednje destilatnih gorivih s konstantno prostornino

Liquid petroleum products - Determination of ignition delay and derived cetane number (DCN) of middle distillate fuels by combustion in a constant volume chamber

Flüssige Mineralölerzeugnisse - Bestimmung des Zündverzugs und der abgeleiteten Cetanzahl (ACZ) von Kraftstoffen aus Mitteldestillaten in einer Verbrennungskammer mit konstantem Volumen

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Produits pétroliers liquides - Détermination du délai d'inflammation et de l'indice de cétane dérivé (ICD) des distillats moyens par combustion dans une enceinte a volume constant

SIST EN 15195:2007
https://standards.iteh.ai/catalog/standards/sist/175aaa61-a767-48c4-8d11-12d55de9b0f5/sist-en-15195-2007

Ta slovenski standard je istoveten z: **EN 15195:2007**

ICS:

75.160.20	Tekoča goriva	Liquid fuels

SIST EN 15195:2007 **en,fr**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

SIST EN 15195:2007

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 15195:2007
https://standards.iteh.ai/catalog/standards/sist/173afa61-a767-48c4-8d1f-12d55de9b0f5/sist-en-15195-2007

SIST EN 15195:2007

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15195

April 2007

ICS 75.160.20

English Version

Liquid petroleum products - Determination of ignition delay and derived cetane number (DCN) of middle distillate fuels by combustion in a constant volume chamber

Produits pétroliers liquides - Détermination du délai d'inflammation et de l'indice de cétane dérivé (ICD) des distillats moyens par combustion dans une enceinte à volume constant

Flüssige Mineralölerzeugnisse - Bestimmung des Zündverzugs und der abgeleiteten Cetanzahl (ACZ) von Kraftstoffen aus Mitteldestillaten in einer Verbrennungskammer mit konstantem Volumen

This European Standard was approved by CEN on 8 March 2007.

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 Management Centre or to any CEN member.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

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 Management Centre has the same status as the official versions.

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

SIST EN 15195:2007
https://standards.iteh.ai/catalog/standards/sist/17a9a071-a787-48c4-8d1f-12d55de9b0f5/sist-en-15195-2007

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

© 2007 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

SIST EN 15195:2007

Contents

Page

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 15195:2007
https://standards.iteh.ai/catalog/standards/sist/173afa61-a767-48c4-8d1f-f2d55de900f5/sist-en-15195-2007

SIST EN 15195:2007

Foreword

This document (EN 15195:2007) 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 October 2007, and conflicting national standards shall be withdrawn at the latest by October 2007.

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 15195:2007
https://standards.iteh.ai/catalog/standards/sist/173afa61-a767-48c4-8d1f-12d55de9b0f5/sist-en-15195-2007

SIST EN 15195:2007

Introduction

This document is derived from joint standardization work in the Energy Institute and ASTM International. It is based on IP 498/06 [1] published by the Energy Institute and harmonized with equivalent IP [2] and ASTM [3] Standards.

The described method is an alternative quantitative determination of the cetane number of middle distillate fuels intended for use in compression ignition engines. Correlation studies between this method and EN ISO 5165:1998 have been done and the results of this are incorporated in this European Standard.

The basis of this method is the derived cetane number correlation equation as given in Clause 13. The ongoing validation of the equation is monitored and evaluated through the existing monthly American and European fuel exchange programs. The validation data will be reviewed by CEN/TC 19 with a frequency of at least every two years. As a result of the review, CEN/TC 19 may make the decision to, if necessary, modify the existing equation/correlation or develop a new one. As part of this review, the sample types will be examined, and if certain types are underrepresented, further steps may be taken to evaluate how they perform.

For the moment the basics of one type of apparatus are described[1]. Once more correlation data on different types of derived cetane number testing equipment is available, CEN/TC 19 will consider revising this European Standard.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 15195:2007
https://standards.iteh.ai/catalog/standards/sist/173afa61-a767-48c4-8d1f-12d55de9b0f5/sist-en-15195-2007

[1] The injection pump in the currently described apparatus is covered by a patent.

SIST EN 15195:2007

1 Scope

This document specifies a test method for the quantitative determination of ignition delay of middle distillate fuels intended for use in compression ignition engines. The method utilizes a constant volume combustion chamber designed for operation by compression ignition, and employing direct injection of fuel into compressed air that is controlled to a specified pressure and temperature. An equation is given to calculate the derived cetane number (DCN) from the ignition delay measurement.

This standard is applicable to diesel fuels, including those containing FAME. The method is also applicable to middle distillate fuels of non-petroleum origin. However, users applying this standard especially to unconventional diesel fuels are warned that the relationship between derived cetane number and combustion behaviour in real engines is not yet fully understood. The standard covers the ignition delay range from 3,3 ms to 6,4 ms (61 DCN to 34 DCN). The combustion analyser can measure shorter or longer ignition delays, but precision can be affected.

NOTE For the purpose of this European Standard, the expression "% (*V/V*)" is used to represent the volume fraction and "% (*m/m*)" the mass fraction.

WARNING — The use of this standard may involve hazardous materials, operations and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2 Normative references

iTeh STANDARD PREVIEW
(standards.iteh.ai)

The following referenced documents are indispensable for the application 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.

SIST EN 15195:2007
https://standards.iteh.ai/catalog/standards/sist/173afa61-a767-48c4-8d1f-
f2dfdad78f0f/sist-en-15195-2007

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

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

EN ISO 3696, *Water for analytical laboratory use - Specification and test methods (ISO 3696:1987)*

EN ISO 5165:1998, *Petroleum products - Determination of the ignition quality of diesel fuels - Cetane engine method (ISO 5165:1998)*

ISO 1998-2:1998, *Petroleum industry – Terminology - Part 2: Properties and tests*

ISO 4010, *Diesel engines — Calibrating nozzle, delay pintle type*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1998-2:1998 and the following apply.

3.1
cetane number
CN
measure of the ignition performance of a fuel in a standardized engine test on a scale defined by reference fuels

NOTE 1 It is expressed as the percentage by volume of hexadecane (cetane) in a reference blend having the same ignition delay as the fuel for analysis. The higher the cetane number, the shorter the ignition delay.

SIST EN 15195:2007

NOTE 2 ISO 1998-2 expresses it as "number on a conventional scale, indicating the ignition quality of a diesel fuel under standardized conditions", but for this document the definition as given is chosen.

3.2
ignition delay
ID
period of time, in milliseconds, between the start of fuel injection and the start of combustion

NOTE In the context of this standard, this period is determined by movement and pressure sensors in the instrument.

3.3
derived cetane number
DCN
calculated value using an equation that correlates a combustion analyser ignition delay result to the cetane number

3.4
accepted reference value
ARV
value agreed upon as a reference for comparison

NOTE The value may be that derived from scientific principles assigned by an accredited organization, or a consensus value based on collaborative experimental work under the auspices of a scientific or engineering group.

3.5
quality control sample
stable and homogenous material(s) similar in nature to the materials under test, properly stored to ensure integrity, and available in sufficient quantity for repeated long-term testing

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 15195:2007
https://standards.iteh.ai/catalog/standards/sist/173af661-767d-48c4-8d1f-
12d55de9b0f5/sist-en-15195-2007

3.6
calibration reference fluid
stable and homogenous fluid used to calibrate the performance of the combustion analyzer

3.7
verification reference fluid
stable and homogenous fluid used to verify the performance of the combustion analyzer

4 Symbols and abbreviations

T_i injector coolant temperature

Ti_{min} minimum injector coolant temperature

Ti_{max} maximum injector coolant temperature

Ta_{min} minimum combustion chamber air temperature

Ta_{max} maximum combustion chamber air temperature

Tps_{min} minimum combustion chamber pressure sensor temperature

Tps_{max} maximum combustion chamber pressure sensor temperature

SIST EN 15195:2007

5 Principle

A test portion of the material under test is injected into a charge of compressed air in a constant volume combustion chamber. Sensors detect the start of injection and the start of combustion for each single-shot cycle. A complete test sequence consists of 15 preliminary combustion cycles to ensure apparatus equilibrium and 32 subsequent test cycles to obtain ignition delay values. The average ignition delay (ID) of these 32 cycles is inserted into an equation to obtain the derived cetane number (DCN). The DCN obtained by this procedure is an estimate of the cetane number (CN) obtained from the conventional large-scale engine test EN ISO 5165.

6 Reagents and materials

6.1 Water, unless otherwise specified, meeting the requirements for grade 3 of EN ISO 3696.

6.2 Coolant system fluid, 50:50 volumetric mixture of commercial grade ethylene glycol-type radiator antifreeze with water (6.1).

NOTE This mixture meets the boiling point requirements and gives adequate protection of the coolant system against corrosion and mineral scale that can alter heat transfer and rating results. See the manufacturer's manual for the correct ethylene glycol-type antifreeze quality.

6.3 Calibration reference fluid, heptane of a purity of minimum 99,5 % (*m/m*) to be used as the designated 3,78 ms ignition delay accepted reference value material.

NOTE If the initial purity is not known and during a long-time stored reference fluid, it is advised to check the purity in accordance with IP 537 [4].

iTeh STANDARD PREVIEW
(standards.iteh.ai)

6.4 Verification reference fluid, methylcyclohexane of a purity of minimum 99,0 % (*m/m*) to be used as the designated 10,4 ms ignition delay accepted reference value material.

SIST EN 15195:2007
https://standards.iteh.ai/catalog/standards/sist/173afa61-a767-48c4-8d1f-12d55de9b0f3/sist-en-15195-2007

NOTE If the initial purity is not known and during a long-time stored reference fluid, it is advised to check the purity in accordance with IP 537 [4].

6.5 Quality control sample

6.6 Combustion charge air, of oxygen content 20,9 % (*V/V*) ± 1,0 % (*V/V*), and containing less than 0,003 % (*V/V*) hydro-carbons and less than 0,025 % (*V/V*) water.

NOTE The effects of air quality deviations are still under investigation. The limiting values are based on current practice.

6.7 Actuating air, oil-free compressed air containing less than 0,1 % (*V/V*) water supplied at a minimum sustained pressure of 1,5 MPa.

6.8 Compressed nitrogen, of minimum purity 99,9 % (*V/V*).

SIST EN 15195:2007

7 Apparatus

7.1 Combustion analyzer

7.1.1 General

The apparatus is described in more detail in Annex A. For the installation and set-up procedures, and for detailed system description, refer to the manufacturer's manual.

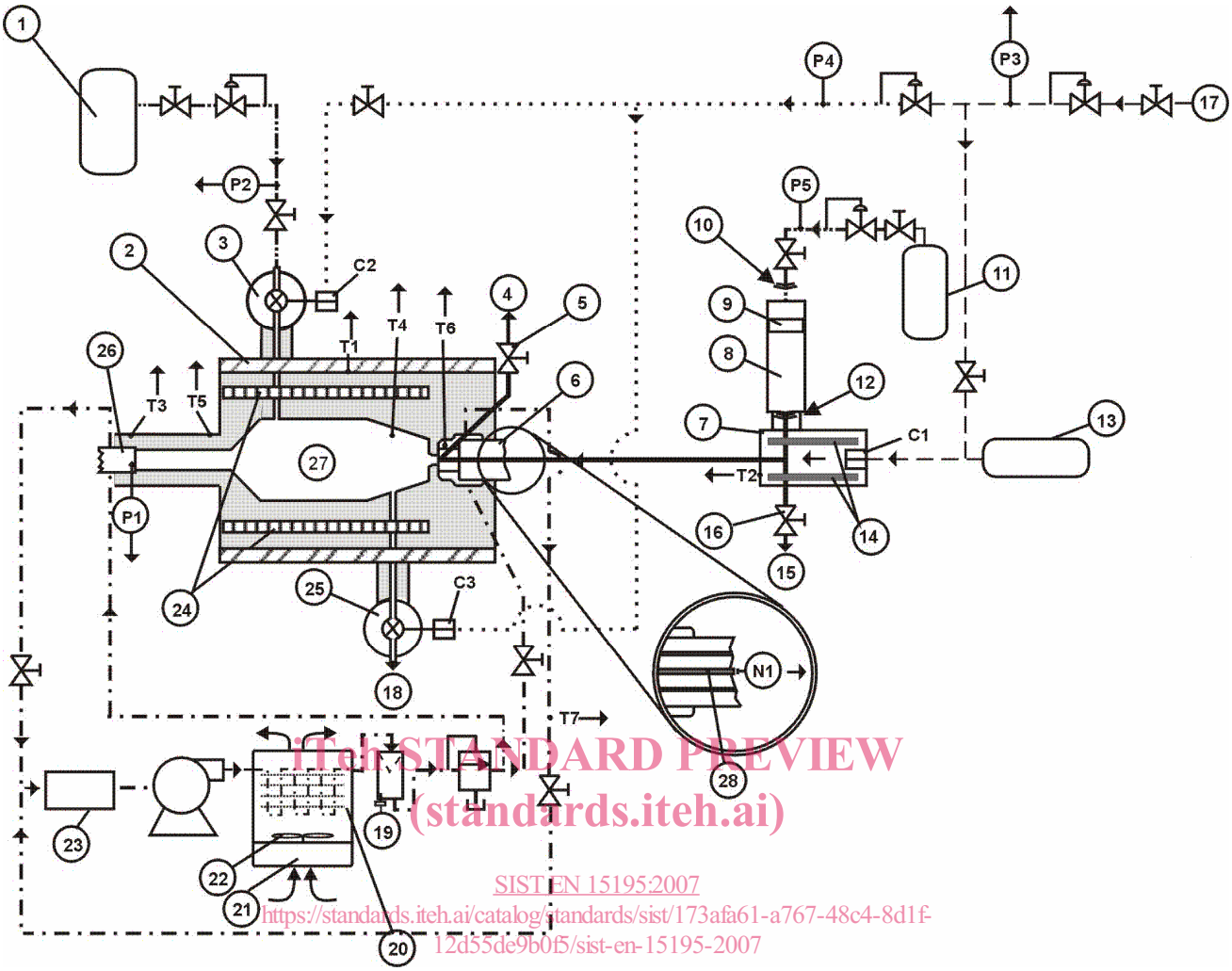
The standard system consists of a heated combustion chamber (see 7.1.2) with fluid cooling of designated areas, external chamber inlet and exhaust valves and associated piping, a pneumatically-driven fuel injection pump, a constant pressure fuel delivery system, a re-circulating coolant system, solenoids, sensors, controls and connection fittings for the compressed gas utilities. Figure 1 gives a schematic outline of the analyzer.

7.1.2 Combustion chamber, steel combustion chamber of capacity 0,213 l ± 0,002 l, further detailed in Annex A.

7.2 Filter medium, with a nominal pore size 3 µm to 5 µm, made of glass fibre, polytetrafluorethylene (PTFE) or nylon, of a size appropriate to the apparatus being used for sample filtration (see 8.4).

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 15195:2007
https://standards.iteh.ai/catalog/standards/sist/173afa61-a767-48c4-8d1f-12d55de9b0f5/sist-en-15195-2007

SIST EN 15195:2007



iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 15195:2007
https://standards.iteh.ai/catalog/standards/sist/173afa61-a767-48c4-8d1f-12d55de9b0f5/sist-en-15195-2007

Key

P1: combustion chamber pressure

P2: combustion chamber air pressure, also charge air pressure

P3: injection actuator air pressure

P4: inlet/exhaust valve actuator air pressure (gauge)

P5: sample fuel reservoir pressure (gauge)

T1: combustion chamber outer surface temperature

T2: fuel injection pump temperature

T3: combustion chamber pressure sensor temperature (T_{ps})

T4: combustion chamber air temperature (T_a), also charge air temperature

T5: (used for diagnostic functions)

T6: injector (nozzle) coolant temperature (T_i)

T7: coolant return temperature

N1: injector nozzle needle motion sensor

C1: digital signal - fuel injection actuator

C2: digital signal - inlet valve actuator

C3: digital signal - exhaust valve actuator

: charge air line

: inlet/exhaust valve actuator air line

: fuel reservoir utility nitrogen line

: fuel injection pump driver air line

: coolant system line

: high pressure fuel line