SLOVENSKI STANDARD
SIST EN 13016-1:2018

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Nadomešča:
SIST EN 13016-1:2007

Tekoči naftni proizvodi - Parni tlak - 1. del: Določevanje z zrakom nasičenega parnega tlaka (ASVP) in enakovrednega parnega tlaka suhega zraka (DVPE)

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

Flüssige Mineralölerzeugnisse - Dampfdruck - Teil 1: Bestimmung des luftgesättigten Dampfdruckes (LGDD) und des berechneten Trockendampfdruckes (BTDD)

Produits pétroliers liquides - Pression de vapeur - Partie 1 : Détermination de la pression de vapeur saturée en air (PVSA) et de la pression de vapeur sèche calculée (PVSC)

Ta slovenski standard je istoveten z: **EN 13016-1:2018**

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EUROPEAN STANDARD

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

Produits pétroliers liquides - Pression de vapeur - Partie 1 : Détermination de la pression de vapeur saturée en air (PVSA) et de la pression de vapeur sèche équivalente calculée (PVSE)

Flüssige Mineralölerzeugnisse - Dampfdruck - Teil 1: Bestimmung des luftgesättigten Dampfdruckes (ASVP) und des berechneten dem trockenen Dampfdruck entsprechenden Druckes (DVPE)

This European Standard was approved by CEN on 27 November 2017.

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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.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 13016-1:2018) 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.

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 2018, and conflicting national standards shall be withdrawn at the latest by October 2018.

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 EN 13016-1:2007.

This new edition has been updated by enlarging the scope to include ethanol blends of up to 85 % (*V/V*). The range for the instrument verification fluids has been widened and new typical/consensus values added in an annex. The precision statements have been updated following a global evaluation in 2016.

EN 13016 consists of the following parts, under the general title *Liquid petroleum products — Vapour pressure*:

— *Part 1: Determination of air saturated vapour pressure (ASVP) and calculated dry vapour pressure equivalent (DVPE)*;

— *Part 2: Determination of absolute pressure (AVP) between 40 C and 100 C*;

— *Part 3: Determination of vapour pressure and calculated dry vapour pressure equivalent (DVPE) (Triple Expansion Method)*.

This part is based on and developed in parallel with IP 394 [9] and ASTM D5191 [5].

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, 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.

Introduction

Vapour pressure is used as a classification criterion for the safe handling and carriage of petroleum products, feedstocks and components; it has a relationship to the potential for hydrocarbon emissions, under uncontrolled conditions, and thus is the subject of environmental scrutiny.

Vapour pressure limitations are often imposed to prevent pump cavitation during transfer operations.

Vapour pressure is one measure of the volatility characteristics of fuels used in many differing types of engines with large variations in operating temperatures. Fuels having a high vapour pressure may vaporize too readily in the fuel handling systems, resulting in decreased flow to the engine and possible stoppage by vapour lock. Conversely, fuels of low vapour pressure may not vaporize readily enough, resulting in difficult starting, slow warm-up and poor acceleration.

1 Scope

This European Standard specifies a method for the determination of the air saturated vapour pressure (ASVP) (total vapour pressure), exerted *in vacuo*, by volatile, low viscosity petroleum products, components, ethanol blends up to 85 % (V/V), and feedstocks containing air. A dry vapour pressure equivalent (DVPE) can be calculated from the air containing vapour pressure (ASVP) measurement.

The conditions used in the test described in this standard are a vapour-to-liquid ratio of 4:1 and a test temperature of 37,8 °C.

The equipment is not wetted with water during the test, and the method described is therefore suitable for testing samples with or without oxygenates; no account is taken of dissolved water in the sample.

This method described is suitable for testing air saturated samples with a DVPE between 15,5 kPa and 106,0 kPa; vapour pressures outside this range can be measured but the precision has not been determined.

This document is applicable to fuels containing oxygenated compounds up to the limits stated in the relevant Council Directive 85/536/EEC [10], and for ethanol-fuel blends up to 85 % (V/V) ethanol.

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

WARNING — The use of this standard can 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 users of this standard to take appropriate measures to ensure the safety and health of personnel prior to application of the standard, and fulfil statutory and regulatory requirements for this purpose.

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 ISO 3170, *Petroleum liquids — Manual sampling (ISO 3170)*

3 Terms and definitions

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

3.1
air saturated vapour pressure
ASVP
observed pressure exerted *in vacuo* consisting of the partial pressure of petroleum products, components and feedstocks, in the absence on non-dissolved water, and the partial pressure of dissolved air

3.2
dry vapour pressure equivalent
DVPE
vapour pressure equivalent value calculated by a statistical correlation formula to a dry Reid vapour pressure as measured by ASTM D4953 [4]

4 Principle

A cooled air saturated sample of known volume is injected into a thermostatically controlled evacuated chamber, or into a chamber that is evacuated by means of a moveable piston after sample introduction, the internal volume of which is five times that of the total test portion introduced into the chamber. After injection into the chamber, the sample is allowed to reach thermal equilibrium at the test temperature 37,8 °C. The resulting total pressure in the chamber is equivalent to the vapour pressure of the sample and the partial pressure of the dissolved air and is measured using a pressure sensor and indicator. The measured total vapour pressure can be converted to a dry vapour pressure equivalent (DVPE) by use of a correlation formula.

5 Reagents and materials

Use chemicals of 99 % (*m/m*) minimum purity for samples for verification of apparatus.

5.1 Pentane.

5.2 2,2 Dimethylbutane.

5.3 2,3 Dimethylbutane.

5.4 Cyclopentane.

5.5 Toluene.

6 Apparatus

6.1 Instrument:

6.1.1 The instrument shall conform to the general requirements given in 6.1.2 to 6.1.6 and be installed, operated and maintained in accordance with the manufacturer's manual.

NOTE Full details of suitable instruments are not given because of differences in the way that the basic principles are applied by individual manufacturers.

6.1.2 The system shall be configured to enable the test chamber to be evacuated and isolated, the sample to be drained, and the system flushed and purged as necessary.

6.1.3 The test chamber shall be vacuum-tight, with a provision for introducing the sample, and shall be capable of containing between 5 ml and 50 ml of liquid and vapour with an accuracy of 1 %.

6.1.3.1 The accuracy of the 4:1 vapour to liquid ratio used in this test method shall be within 3,95:1 and 4,05:1.

6.1.3.2 The test chamber shall be capable of controlling the temperature of the sample to achieve the specified test temperature to within ± 0,1 °C.

6.1.3.3 Temperature measuring device, a sensor with a resolution of 0,1 °C and an accuracy of 0,1 °C, with calibration/verification traceable to national measurement standards.

NOTE The test chambers used in the instruments that generated the precision statements were constructed from either aluminium or stainless steel.

6.1.3.4 Test chambers with capacities less than 5 ml or greater than 50 ml may be used but the precision of the method can be affected.

6.1.4 The apparatus shall be capable of measuring the vapour pressure of small samples of petroleum products, components and feedstocks up to, at least, 130,0 kPa, by means of a pressure transducer.

6.1.4.1 Pressure transducer having a minimum measuring range from 0 kPa to 130 kPa, with an accuracy of ≤ 0,8 kPa and a resolution of ≤ 0,1 kPa with calibration/verification traceable to national measurement standards.

6.1.5 If a vacuum pump is required for use with the instrument, it shall be capable of reducing the pressure in the test chamber to less than 0,01 kPa absolute.

6.1.6 If a vacuum-tight syringe or similar equipment is required for measuring or injecting the required volume of sample into the test chamber, it shall be sized appropriately to the required sample size with an accuracy of at least 1 %.

6.2 Cooling equipment, iced-water bath or refrigerator, capable of cooling the samples and any syringes (6.1.6) used, to a temperature of between 0 °C and 1 °C, where a suitably safe refrigerator should be used with highly volatile petroleum products.

6.3 Barometer, capable of measuring atmospheric pressure within an accuracy of 0,1 kPa or better and with calibration/verification traceable to national measurement standards.

6.4 Vacuum gauge, covering at least the range 0,01 kPa to 0,67 kPa, with an accuracy and resolution of ± 0,1 kPa with calibration/verification traceable to national measurement standards.

7 Sampling

7.1 Due to the extreme sensitivity of vapour pressure measurements to losses through evaporation and the resulting changes in composition, the utmost precaution and the most meticulous care shall be taken in the drawing and handling of samples.

7.2 Samples shall be drawn in accordance with EN ISO 3170 and/or in accordance with the requirements of National Standards for the sampling of the product under test. However, the water displacement technique shall not be used.

The drawing of samples using automatic techniques, such as those described in EN ISO 3171 [2], is not recommended unless the technique has been proven not to lose light ends from the product or component being sampled. Loss of light ends can affect the vapour pressure measurement.

7.3 For routine testing, the sample shall be supplied in a sealed container, constructed of suitable material, of at least 250 ml capacity. The container shall be a minimum of 70 % (*V/V*) full of sample at the time of receipt. See also 15.1.

7.4 Protect samples from excessive temperatures, as soon as possible, prior to testing. This can be accomplished by storage in the cooling equipment (6.2).

7.5 Samples in leaking containers shall not be considered for testing, but shall be discarded and new samples obtained.