



SLOVENSKI STANDARD
SIST EN 13016-1:2000
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Liquid petroleum products - Vapour pressure - Part 1: Determination of air saturated vapour pressure (ASVP)

Flüssige Mineralölerzeugnisse - Dampfdruck - Teil 1: Bestimmung des luftgesättigten Dampfdruckes (ASVP)

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

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Ta slovenski standard je istoveten z: EN 13016-1:2000

ICS:

75.160.20 V^\[æ\ [iãæ Liquid fuels

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English version

Liquid petroleum products - Vapour pressure - Part 1:
Determination of air saturated vapour pressure (ASVP)

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

Flüssige Mineralölzeugnisse - Dampfdruck - Teil 1:
Bestimmung des luftgesättigten Dampfdruckes (ASVP)

This European Standard was approved by CEN on 4 August 2000.

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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 19 "Petroleum products, lubricants and related products", the secretariat of which is held by NNI.

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 February 2001, and conflicting national standards shall be withdrawn at the latest by February 2001.

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

Annex A is for information only.

This European Standard is one of a series of standards as listed below:

EN 13016, *Liquid petroleum products - Vapour pressure*

Part 1: Determination of air saturated vapour pressure (ASVP).

Part 2: Determination of absolute vapour pressure (AVP) between 40 °C and 100 °C.

NOTE Part 1 is based on IP 394¹⁾ and ASTM D 5191²⁾.

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¹⁾ IP 394: Determination of air saturated vapour pressure (ASVP)

²⁾ ASTM D 5191:1996, Test method for vapour pressure of petroleum products (mini method)

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 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 total pressure, exerted in vacuo, by volatile, low viscosity petroleum products, components, and feedstocks containing air. An equivalent dry vapour pressure 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, a sample size of 1 l, and a test temperature of 37,8 °C.

NOTE 1 See annex A for information on the precision values when using 50 ml samples or using a test temperature of 50,0 °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 that exert an air saturated vapour pressure of between 9,0 kPa and 150,0 kPa at 37,8 °C.

This European Standard is applicable to fuels containing oxygenated compounds up to the limits stated in the relevant EC Directive³⁾.

NOTE 2 For the purposes of this European Standard, the term “% (V/V)” is used to represent the volume fraction.

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 the user of this standard to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.

³⁾ EC Directive 85/536/EEC, Council Directive on crude-oil savings through the use of substitute fuel components in petrol.

2 Normative references

This European Standard incorporates by dated or undated 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 3170, *Petroleum liquids - Manual sampling (ISO 3170:1988, including Amendment 1:1998)*.

3 Terms and definitions

For the purposes of this standard, the following definition applies:

3.1

air-saturated vapour pressure

ASVP

total pressure exerted in vacuo by air-saturated petroleum products, components and feedstocks, in the absence of undissolved water, the total pressure being the sum of the partial pressure of the sample and the partial pressure of the dissolved air

4 Principle

A cooled air-saturated sample of known volume is injected into an evacuated chamber, or into a chamber which is formed by means of a moveable piston at the time of injection of the sample, which is contained in a thermostatically controlled block at the required vapour-to-liquid ratio. 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.

5 Apparatus

5.1 Instrument

5.1.1 The instrument shall conform to the general requirements given in 5.1.2 to 5.1.6.

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

The instrument shall be installed, operated and maintained in accordance with the manufacturer's manual.

5.1.2 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.

5.1.3 The test chamber shall be vacuum-tight, with provision for the injection of the sample, and shall be capable of containing between 5 ml and 15 ml of liquid and vapour with an accuracy of 1 %. The test chamber shall be capable of controlling the temperature of the sample to achieve the specified test temperature to within $\pm 0,1$ °C and of indicating the temperature to a resolution of at least 0,1 °C.

NOTE 1 The test chambers used in the instruments which generated the precision statements were constructed from either aluminum or stainless steel.

NOTE 2 Test chambers with capacities less than 5 ml or greater than 15 ml may be used but the precision of the method can be affected.

5.1.4 The apparatus shall be capable of measuring the vapour pressure of small samples of petroleum products, components and feedstocks over the range 9,0 kPa to 150,0 kPa, by means of a pressure transducer, with an accuracy of 0,8 kPa and a resolution of 0,1 kPa.

5.1.5 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.

5.1.6 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 %.

5.2 Cooling equipment, air or iced-water bath or refrigerator, capable of cooling the samples to a temperature of between 0 °C and 1 °C.

NOTE An intrinsically safe refrigerator should be used with petroleum products.

5.3 Barometer, capable of measuring atmospheric pressure within an accuracy of 0,1 kPa or better and calibrated and/or verified against an instrument certified by an authorized certification body.

5.4 Vacuum gauge or pressure transducer, covering at least the range 0 kPa to 0,67 kPa, calibrated and/or verified against an instrument certified by an authorized certification body.

5.5 Temperature measuring device, in the required temperature ranges, with a resolution of 0,1 °C and scale error of less than 0,1 °C, calibrated and/or verified against an instrument certified by an authorized certification body.

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6 Sampling

SIST EN 13016-1:2000

6.1 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.

6.2 Samples shall be drawn in accordance with EN ISO 3170. However, the water displacement technique shall not be used.

NOTE The drawing of samples using automatic techniques, such as those described in EN ISO 3171⁴⁾, is not recommended unless a variable volume sample receiver is used to collect and transport the sample to the test laboratory. The use of a fixed volume receiver, pressurized or not, may well result in the loss of light ends from the product being sampled, thereby affecting the vapour pressure measurement.

⁴⁾ EN ISO 3171: Petroleum liquids - Automatic pipeline sampling (ISO 3171:1988)

6.3 For routine testing, the sample shall be supplied in a container, constructed of suitable material, of either 1 l capacity or in a container of a different capacity with the same ullage requirement. For referee testing, a 1 l sample container shall be used. The container shall be a minimum of 70 % (V/V) full of sample at the time of receipt .

6.4 Samples shall be placed in a cool place as soon as possible after they have been obtained and held there until the test has been completed. Samples in leaking containers shall not be considered for testing but shall be discarded and new samples obtained.

7 Sample preparation

7.1 The vapour pressure determination shall be the first test on a sample. For referee testing, only one test portion shall be taken from the container; for routine testing, it is permitted for further samples to be taken from the same container.

7.2 Before the sample container is opened, place it in the cooling equipment (5.2) and allow sufficient time for the container and contents to cool to between 0 °C and 1 °C.

NOTE Sufficient time to reach this temperature may be ensured by direct measurement of the temperature of a similar liquid in a similar container placed in the same bath at the same time as the sample.

7.3 With the sample at a temperature of 0 °C to 1 °C, remove the container from the cooling equipment and wipe dry with an absorbent material. Unseal the container (if it is not transparent) and examine the sample content.

7.4 The sample content shall be 70 % (V/V) to 80 % (V/V) of the container capacity. Discard the sample if its volume is less than 70 % (V/V) of the container capacity. If the container is more than 80 % (V/V) full, pour out sufficient sample to bring the container contents within the 70 % (V/V) to 80 % (V/V) range. Under no circumstances shall any sample be returned to the container if it has been poured out previously. Reseal the container and return it to the cooling equipment (5.2).

7.5 To ensure that the sample is air saturated, remove the container from the cooling equipment when the sample is at a temperature of 0 °C to 1 °C. Wipe the container dry with absorbent material, unseal it momentarily taking care that no water enters, reseal it and shake vigorously. Return to the cooling equipment for a minimum of 2 min.

7.6 Repeat 7.5 twice. Return the sample to the cooling equipment until commencing the test.

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8 Preparation of apparatus [d37483615bff/sist-en-13016-1-2000](https://standards.iteh.ai/catalog/standards/sist/7c189b72-c6e6-4556-8f56-d37483615bff/sist-en-13016-1-2000)

8.1 Prepare the instrument for operation in accordance with the manufacturer's instructions.

8.2 Prepare the test chamber, as required to avoid contamination of the test portion, according to the manufacturer's instructions. Where an evacuated chamber is used, determine visually from the instrument display that the test chamber pressure is stable and does not exceed 0,1 kPa. When the pressure is not stable, or exceeds this value, check no traces of volatile components are present in the chamber from a previous sample or check the calibration of the transducer.

8.3 If a syringe is used for injection of the test portion, cool it to between 0 °C and 1 °C in an air bath or refrigerator before drawing in the sample. Avoid water contamination of the syringe reservoir by sealing the outlet of the syringe suitably during the cooling process.

8.4 Prior to injection of the test portion check that the temperature of the test chamber is within the required temperature range of 37,8 °C ± 0,1 °C.

9 Calibration of apparatus

9.1 Pressure transducer

9.1.1 Check the calibration of the transducer at 37,8 °C on a monthly basis or when required as indicated from the quality control checks. The calibration of the transducer shall be checked using two reference points; zero pressure (< 0,1 kPa) and the ambient barometric pressure which has been corrected for temperature using the following values:

- a) at temperatures between 10 °C and 19 °C, subtract 0,1 kPa from the barometer reading;
- b) at temperatures between 20 °C and 29 °C, subtract 0,2 kPa from the barometer reading;
- c) at temperatures above 30 °C, subtract 0,3 kPa from the barometer reading.

NOTE A mercury column barometer is the most accurate and suitable device for calibrating the atmospheric pressure display of the apparatus, however, these barometers are either calibrated at 0 °C or are manufactured using the density of mercury as defined at 0 °C. This means that, when the barometer is used in the laboratory at ambient temperature, the reading of the barometer will be slightly high. The necessary correction varies with temperature and atmospheric pressure, but the corrections given in a) to c) are sufficient for the method described.

9.1.2 Connect the calibrated vacuum gauge or pressure transducer (5.4) to the vacuum source in line with the test chamber. When the calibrated gauge or transducer registers a pressure less than 0,1 kPa, adjust the transducer control to zero or to the actual reading on the calibrated gauge or transducer as dictated by the instrument design and the manufacturer's instructions.

9.1.3 Open the test chamber to the atmosphere and observe the transducer reading. If the pressure reading is not equal to the ambient barometric pressure (which has been corrected for temperature in accordance with 9.1.1), adjust the transducer span control until the appropriate reading is observed. Ensure that the instrument is set to display the total pressure and not a calculated or corrected value.

9.1.4 Repeat 9.1.2 and 9.1.3 until the zero and barometric pressures read to within ± 0,1 kPa without further adjustment.

NOTE Some instruments automate the calibration procedure and carry out these repeat operations automatically.