

Liquid petroleum products - Vapour pressure - Part 3:  
Determination of vapour pressure and calculated dry  
vapour pressure equivalent (DVPE) (Triple expansion  
method)

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>See Eesti standard EVS-EN 13016-3:2025 sisaldab Euroopa standardi EN 13016-3:2025 ingliskeelset teksti.</p> <p>Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 23.04.2025.</p> <p>Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.</p>	<p>This Estonian standard EVS-EN 13016-3:2025 consists of the English text of the European standard EN 13016-3:2025.</p> <p>This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.</p> <p>Date of Availability of the European standard is 23.04.2025.</p> <p>The standard is available from the Estonian Centre for Standardisation and Accreditation.</p>
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ICS 75.160.20

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EUROPEAN STANDARD

EN 13016-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2025

ICS 75.160.20

Supersedes EN 13016-3:2018

English Version

**Liquid petroleum products - Vapour pressure - Part 3:  
Determination of vapour pressure and calculated dry  
vapour pressure equivalent (DVPE) (Triple expansion  
method)**

Produits pétroliers liquides - Pression de vapeur -  
Partie 3 : Détermination de la pression de vapeur et de  
la pression de vapeur sèche équivalente calculée  
(PVSE) (Méthode triple expansion)

Flüssige Mineralölzeugnisse - Dampfdruck - Teil 3:  
Bestimmung des Dampfdruckes und des berechneten  
dem trockenen Dampfdruck entsprechenden Druckes  
(DVPE) (Dreifach-Expansionsmethode)

This European Standard was approved by CEN on 14 March 2025.

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.

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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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## European foreword

This document (EN 13016-3:2025) 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 2025, and conflicting national standards shall be withdrawn at the latest by October 2025.

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 13016-3:2018.

EN 13016-3:2025 includes the following significant technical changes with respect to EN 13016-3:2018:

- updated safety warning;
- revised 15.1 to include 250 ml and 1 000 ml sample details;
- updated 15.2 and 15.3 text;
- updated Clause 6 Apparatus traceability requirements;
- new normative Annex B giving precision for 1 000 ml containers;
- new reagents in 5.4, 5.5, Clause 11 and new normative Annex A for verification purposes.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye 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 can 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 vaporize not readily enough, resulting in difficult starting, slow warm-up and poor acceleration.

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 619 [9] and ASTM D6378 [3].

## 1 Scope

This document specifies a method for the determination of the vapour pressure, exerted *in vacuo*, by volatile, low viscosity petroleum products, components, ethanol blends up to 85 % (V/V), and feedstocks using a variable volume chamber. A dry vapour pressure equivalent (DVPE) is calculated from the vapour pressure.

The conditions used in the test described in this document 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 procedure calculates the partial pressure of the air dissolved in the test portion during the triple expansion process. It is suitable for samples with a DVPE between 15,7 kPa and 97,6 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 [6], and for ethanol-fuel blends up to 85 % (V/V) ethanol.

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

**WARNING** — The use of this document can involve hazardous materials, operations and equipment. This document does not purport to address all of the safety problems associated with its use. It is the responsibility of users of this document to take appropriate measures to ensure the safety and health of personnel prior to application of the standard, and to determine the applicability of any further restrictions 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)*

ISO 4259-4, *Petroleum and related products — Precision of measurement methods and results — Part 4: Use of statistical control charts to validate ‘in-statistical-control’ status for the execution of a standard test method in a single laboratory*

## 3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org>

### 3.1

#### vapour pressure

#### VP

total pressure minus the partial pressure of the dissolved air in the liquid at a vapour to liquid ratio of 4:1 and at 37,8 °C