



BSI Standards Publication

Determination of flash point — Abel closed-cup method

National foreword

This British Standard is the UK implementation of EN ISO 13736:2021+A1:2022. It is identical to ISO 13736:2021, incorporating amendment 1:2022. It supersedes BS EN ISO 13736:2013 (dual numbered as BS 2000-170:2013), which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to ISO text carry the number of the ISO amendment. For example, text altered by ISO amendment 1 is indicated by **A1** **A1**.

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A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

Determination of flash point - Abel closed-cup method (ISO 13736:2021)

Détermination du point d'éclair - Méthode Abel en vase
clos (ISO 13736:2021)

Bestimmung des Flammpunktes - Verfahren mit
geschlossenem Tiegel nach Abel (ISO 13736:2021)

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

European foreword to Amendment 1

This document (EN ISO 13736:2021) has been prepared by Technical Committee ISO/TC 28 "Petroleum and related products, fuels and lubricants from natural or synthetic sources" in collaboration with 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of an identical text or by endorsement, at the latest by October 2021, and conflicting national standards shall be withdrawn at the latest by October 2021.

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.

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Endorsement notice to Amendment 1

The text of ISO 13736:2021 has been approved by CEN as EN ISO 13736:2021 without any modification.

European foreword

This document (EN ISO 13736:2021/A1:2022) has been prepared by Technical Committee ISO/TC 28 "Petroleum and related products, fuels and lubricants from natural or synthetic sources" in collaboration with 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 Amendment to the European Standard EN ISO 13736:2021 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2023, and conflicting national standards shall be withdrawn at the latest by March 2023.

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Endorsement notice

The text of ISO 13736:2021/Amd 1:2022 has been approved by CEN as EN ISO 13736:2021/A1:2022 without any modification.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 19, *Gaseous and liquid fuels, lubricants and related products of petroleum, synthetic and biological origin* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 13736:2013), which has been technically revised.

The main changes compared to the previous edition are as follows:

- the [Subclause 7.5](#) has been further elaborated;
- under [13.2](#) and [13.3](#), the precision definitions have been updated in line with ISO 4259-1[3];
- in [Annex C](#) the digital contact thermometers have been introduced and furthermore explanation on the generic liquid-in-glass thermometers has been introduced;
- [Annex D](#) has been revised (especially the evaluation subclause) and changed to normative status;
- a new [Annex E](#) on flash point values of chemicals has been introduced.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Flash point values are used in shipping, storage, handling and safety regulations, as a classification property to define “flammable” and “combustible” materials. Precise definition of the classes is given in each particular regulation.

A flash point value can indicate the presence of highly volatile material(s) in a relatively non-volatile or non-flammable material, and flash point testing can be a preliminary step to other investigations into the composition of unknown materials.

Flash point determinations are not appropriate for potentially unstable, decomposable, or explosive materials, unless previously established that heating the specified quantity of such materials in contact with the metallic components of the flash point apparatus, within the temperature range required for the method, does not induce decomposition, explosion or other adverse effects.

Flash point values are not a constant physical-chemical property of materials tested. They are a function of the apparatus design, the condition of the apparatus used, and the operational procedure carried out. Flash point can therefore be defined only in terms of a standard test method, and no general valid correlation can be guaranteed between results obtained by different test methods or with test apparatus different from that specified.

ISO/TR 29662^[Z] gives useful advice on carrying out flash point tests and interpreting results.

Determination of flash point — Abel closed-cup method

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 the application of the standard, and to determine the applicability of any other restrictions for this purpose.

1 Scope

This document specifies a method for the determination of the manual and automated closed cup flash point of combustible liquids having flash points between $-30,0\text{ }^{\circ}\text{C}$ to $75,0\text{ }^{\circ}\text{C}$. However, the precision given for this method is only valid for flash points in the range $-8,5\text{ }^{\circ}\text{C}$ to $75,0\text{ }^{\circ}\text{C}$.

This document is not applicable to water-borne paints.

NOTE 1 Water borne paints can be tested using ISO 3679^[1].

NOTE 2 See 9.1 for the importance of this test in avoiding loss of volatile materials.

NOTE 3 Liquids containing halogenated compounds can give anomalous results.

NOTE 4 The thermometer specified for the manual apparatus limits the upper test temperature to $70,0\text{ }^{\circ}\text{C}$.

NOTE 5 See 13.1 for more specific information related to precision.

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.

ISO 3170, *Petroleum liquids — Manual sampling*

ISO 3171, *Petroleum liquids — Automatic pipeline sampling*

ISO 15528, *Paints, varnishes and raw materials for paints and varnishes — Sampling*

3 Terms and definitions

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

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

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

3.1

flash point

lowest temperature of the test portion, adjusted to account for variations in atmospheric pressure from $101,3\text{ kPa}$, at which application of an ignition source causes the vapour of the test portion to ignite and the flame to propagate across the surface of the liquid under the specified conditions of test

4 Principle

The test portion is placed in the test cup of an Abel apparatus and heated to give a constant temperature increase with continuous stirring. An ignition source is directed through an opening in the test cup cover at regular temperature intervals with simultaneous interruption of stirring. The lowest temperature at which application of the ignition source causes the vapours of the test portion to ignite and propagate over the surface of the liquid is recorded as the flash point at the ambient barometric pressure. The temperature is adjusted to account for variation in atmospheric pressure from 101,3 kPa, using a formula.

5 Chemicals and materials

5.1 Cleaning solvent, for the removal of traces of sample from the test cup and cover.

The choice of solvent depends upon the previous material tested, and the tenacity of the residue. Low volatility aromatic (benzene-free) solvents may be used to remove traces of oil, and mixed solvents can be efficacious for the removal of gum-type deposits.

5.2 Coolant, mixture of equal volumes of 1,2-ethanediol (ethylene glycol) and water, or mixture of equal volumes of glycerol and water, or silicone oil (optional), for use in an external cooling bath (6.5) or in the Abel apparatus (6.1).

5.3 Lubricant (optional), to reduce the formation of ice crystals on the cover and shutter mechanism when carrying out tests at temperatures below 5,0 °C (7.4.3, Note 1).

5.4 Verification liquids, certified reference materials (CRM) and secondary working standards (SWS) as described in Annex D.

5.5 Ignitor and pilot light gas, which may be propane, butane or natural gas (not required if an electric ignitor is used).

6 Apparatus

6.1 Flash point apparatus, as specified in Annex A.

If automated equipment is used, ensure that the test cup and cover assembly conform to the key dimensions specified in A.2 and that the procedure described in Clause 10 is followed. The user shall ensure that all of the manufacturer's instructions for adjusting and operating the instrument are followed.

In cases of dispute, unless explicitly agreed otherwise, the manual determination of the flash point, using a flame ignition source, shall be considered the referee test.

6.2 Thermometers

6.2.1 Test cup thermometer, installed as in Annex B and conforming to the specification given in Annex C.

6.2.2 Heating vessel thermometer, installed as in Annex B and conforming to the specification given in Annex C.

Other types of temperature-measuring device may be used, provided that they meet the requirements for accuracy and have the same response as the thermometers specified in Annex C.

6.3 Timing device, stopwatch or electronic timer with an accuracy better than 5 %.