



Institut luxembourgeois de la normalisation
de l'accréditation, de la sécurité et qualité
des produits et services

ILNAS-EN 12595:2023

**Bitumen and bituminous binders -
Determination of kinematic viscosity**

Bitumes et liants bitumineux -
Détermination de la viscosité
cinématique

Bitumen und bitumenhaltige Bindemittel
- Bestimmung der kinematischen
Viskosität

07/2023



National Foreword

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**Bitumen and bituminous binders - Determination of
kinematic viscosity**

Bitumes et liants bitumineux - Détermination de la
viscosité cinématique

Bitumen und bitumenhaltige Bindemittel -
Bestimmung der kinematischen Viskosität

This European Standard was approved by CEN on 28 May 2023.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 12595:2023) has been prepared by Technical Committee CEN/TC 336 “Bituminous binders”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by January 2024, and conflicting national standards shall be withdrawn at the latest by January 2024.

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 12595:2014.

In comparison with the previous edition, the main technical changes are:

- deletion of note in scope and new note added to scope regarding assumption of Newtonian behaviour under test conditions;
- removal of dated reference in normative references (ISO 2592);
- formula for the relationship between dynamic and kinematic viscosity added in 3.1;
- “accuracy” changed to “maximum permissible error” in several Clauses (5.2, 5.4, 5.5 and 5.6);
- references to mercury thermometers and total immersion thermometer in 5.2 deleted;
- new sub-Clause 5.7 added on Calibration/Verification;
- additional information on use of viscometers and references to figures added in 7.1;
- mandatory use of two BS/IP/RF viscometers for one determination of kinematic viscosity;
- precision on time for thermal equilibrium and removal of note in 7.2;
- information on validity of individual test data to calculate mean value added in Clause 8; including a new Note 1 and renumbering existing note to Note 2;
- key added to Figures A.1, A.2 and A.3 and correct diameter of bulb in key of Figure A.1;
- Figures A.2 and A.3 revised;
- Table B.1 updated with informative values for viscosity standards;
- Annex C deleted;
- new Annex C introduced with examples on calculation;
- ASTM E77-98 deleted from Bibliography;
- reference to ASTM D2170-01 in Bibliography has been updated and reference (footnote) to Institute of Petroleum deleted.

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

1 Scope

This document specifies a method for the determination of the kinematic viscosity of bituminous binders at 60 °C and 135 °C, in a range from 6 mm²/s to 300 000 mm²/s. Other temperatures are possible if calibration constants are known. Bituminous emulsions are not covered within the scope of this method.

Results for this method can be used to calculate dynamic viscosity when the density of the test material is known or can be determined.

NOTE This document assumes Newtonian behaviour of the sample at test conditions.

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 the user of this document to identify the hazards and assess the risks involved in performing this test method and to implement sufficient control measures to protect individual operators (and the environment). This includes appropriate safety and health practices and determination of the applicability of regulatory limitations prior to use.

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.

EN 58, *Bitumen and bituminous binders - Sampling bituminous binders*

EN 12594, *Bitumen and bituminous binders - Preparation of test samples*

EN 12607-2, *Bitumen and bituminous binders - Determination of the resistance to hardening under influence of heat and air - Part 2: TFOT method*

EN ISO 2592, *Petroleum and related products - Determination of flash and fire points - Cleveland open cup method (ISO 2592)*

EN ISO 3696:1995, *Water for analytical laboratory use - Specification and test methods (ISO 3696)*

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**kinematic viscosity**

ratio between the dynamic viscosity and the density of a liquid at the temperature of measured viscosity

$$\nu = \frac{\eta}{\rho}$$

where

ν is kinematic viscosity;

η is dynamic viscosity;

ρ is density.

Note 1 to entry: Kinematic viscosity is a measure of a liquid's resistance to flow under gravity.

Note 2 to entry: The SI unit of kinematic viscosity is m²/s; for practical use, a sub-multiple (mm²/s) is more convenient.

3.2**density**

mass of a liquid divided by its volume

Note 1 to entry: When reporting density, the unit of density used, together with the temperature, is explicitly stated, for example kg/m³.

Note 2 to entry: The SI unit of density is kg/m³.

3.3**dynamic viscosity**

ratio between the applied shear stress and the velocity gradient

Note 1 to entry: Dynamic viscosity is a measure of a liquid's resistance to flow, and is commonly called the viscosity of the liquid.

Note 2 to entry: The SI unit of dynamic viscosity is Pa·s.

3.4**Newtonian liquid**

liquid with a viscosity that is independent of the rate of shear

Note 1 to entry: The constant ratio of the shear stress to the velocity gradient is the dynamic viscosity of the liquid. If this ratio is not constant, the liquid is non-Newtonian.

4 Principle

The time for a fixed volume of the liquid to flow through the capillary of a calibrated glass capillary viscometer under an accurately reproducible head and at a closely controlled temperature is determined (efflux time). The kinematic viscosity is calculated by multiplying the efflux time in seconds by the viscometer calibration factor.

5 Apparatus

Usual laboratory apparatus and glassware, together with the following: