International Standard

ISO 18335

First edition
2024-01

Petroleum products and related products — Determination of kinematic viscosity by calculation from the measured dynamic viscosity and density – Method by constant pressure viscometer

Produits pétroliers et produits connexes — Détermination de la viscosité cinématique par calcul à partir des mesures de viscosité dynamique et de masse volumique — Méthode par viscosimètre à pression constante

Reference number
ISO 18335:2024(en)

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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Foreword

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Introduction

The purpose of this document is to specify a procedure for measuring dynamic viscosity and density, and then calculating kinematic viscosity from these measurements, when applied to petroleum and related liquids. Kinematic viscosity is often a characteristic that is specified in product specifications and is a frequent measurement in testing laboratories. The constant pressure viscometer provides a versatile and efficient technique using less time and labour for the laboratory.

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Petroleum products and related products — Determination of kinematic viscosity by calculation from the measured dynamic viscosity and density – Method by constant pressure viscometer

1 Scope

This document specifies a procedure for determining dynamic viscosity, η, and density, ρ, for the calculation of kinematic viscosity, ν, of middle distillate fuels, fatty acid methyl ester fuels (FAME) and mixtures thereof, up to 60 % with middle distillate fuels, and lubricating oils (e.g. base oils, formulated oils), and synthetics, using a constant pressure viscometer. The range of kinematic viscosities covered in this test method is from 0,5 mm^2/s to 2 000 mm^2/s, with precision at 40 °C from 1,0 mm^2/s to 1 286 mm^2/s, and precision at 100 °C from 3,0 mm^2/s to 157 mm^2/s.

The result obtained using the procedure described in this document depends on the rheological behaviour of the sample. This document is predominantly applicable to liquids whose shear stress and shear rate are proportional (Newtonian flow behaviour). However, if the viscosity changes significantly with the shear rate, comparison with other measuring methods is only permissible at similar shear rates.

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*

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
density
ρ
mass per unit volume of a substance at a given temperature

3.2
dynamic viscosity
η
ratio between the applied shear stress and rate of shear of a liquid at a given temperature

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