



**International
Standard**

ISO 19403-4

**Paints and varnishes —
Wettability —**

Part 4:

**Determination of the polar
and dispersive fractions of the
surface tension of liquids from an
interfacial tension**

Peintures et vernis — Mouillabilité —

*Partie 4: Détermination des fractions polaire et dispersive
de la tension superficielle des liquides à partir d'une tension
interfaciale*

**Second edition
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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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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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 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 139, *Paints and varnishes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 19403-4:2017), which has been technically revised.

<https://standards.iteh.ai/catalog/standards/iso/7f8e2c6c-0050-4905-8345-20dec0064624/iso-19403-4-2024>
The main changes are as follows:

- in 5.3, the requirement on the wall thickness of the optical cell has been reduced to 2 mm;
- in 5.4, the requirement for the reference liquids has been changed from colourless to transparent;
- the normative references have been updated.

A list of all parts in the ISO 19403 series can be found on the ISO website.

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.

Paints and varnishes — Wettability —

Part 4:

Determination of the polar and dispersive fractions of the surface tension of liquids from an interfacial tension

1 Scope

This document specifies a test method to determine the polar and dispersive fractions of the surface tension of liquids from an interfacial tension with optical methods. The method can be applied for the characterization of liquid coating materials, especially if drying effects occur during alternative measurement. If applied to liquids with non-Newtonian flow behaviour (see ISO 3219-1:2021, 3.22), restrictions can apply.

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 1409, *Plastics/rubber — Polymer dispersions and rubber latices (natural and synthetic) — Determination of surface tension*

ISO 4618, *Paints and varnishes — Vocabulary*

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

ISO 19403-1, *Paints and varnishes — Wettability — Part 1: Vocabulary and general principles*

ISO 19403-3, *Paints and varnishes — Wettability — Part 3: Determination of the surface tension of liquids using the pendant drop method*

EN 14370, *Surface active agents — Determination of surface tension*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4618 and ISO 19403-1 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/>

4 Principle

One drop of the respective liquid to be tested, hanging from or ascending from a needle, is reproduced within an optical cell, which is completely filled with a reference liquid. The reproduced drop shall deviate significantly from the spherical shape due to the difference in density compared to the reference liquid. The interfacial tension is calculated from the shape of the reproduced pendant or ascending drop according to the Young-Laplace equation (see ISO 19403-1:2022, 3.2.2). The polar and dispersive fraction of the surface

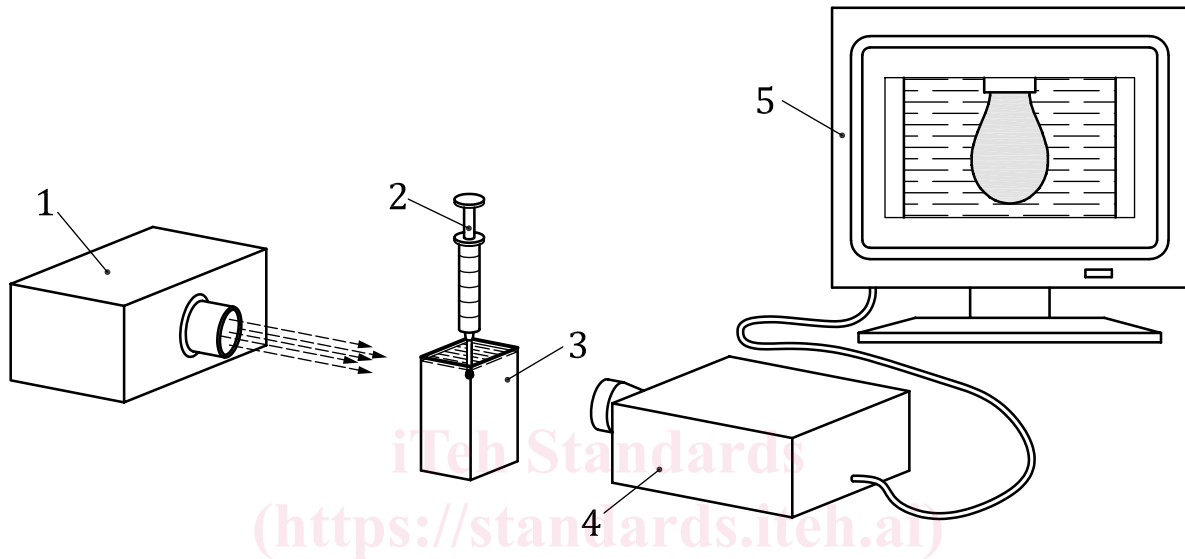
tension of the liquid to be tested can be determined from the obtained interfacial tension and the known surface tensions of both the liquid to be tested and the reference liquid.

5 Apparatus and materials

Ordinary laboratory apparatus, together with the following, shall be used.

5.1 Drop contour analysis system, for measurement of the surface tension of pendant drops.

Any state-of-the-art drop contour analysis system with digital image capture and analysis can be used. [Figure 1](#) and [Figure 2](#) show a schematic example of a drop contour analysis system.



Key

- 1 light source
- 2 dosing unit with graduated microsyringe
- 3 optical cell
- 4 image taking and analysing unit
- 5 screen

Figure 1 — Drop contour analysis system with pendant drop