

172

International Standard



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**Optics and optical instruments — Microscopes —
Part 1: Immersion oil for general use in light microscopy**

Optique et instruments d'optique — Microscopes — Partie 1: Huile d'immersion pour usage général en microscopie optique

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8036/1 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Optics and optical instruments — Microscopes — Part 1: Immersion oil for general use in light microscopy

0 Introduction

The image quality of microscopes with oil immersion objectives is dependent on the optical properties of the immersion oil used. In order to guarantee a certain minimum quality, this International Standard specifies the relevant properties of immersion oil for general use with the purpose of making immersion oil with the specified properties available throughout the world.

The optical and physical requirements for immersion oil have been specified taking into account the optical properties of objectives which are in general use and which are made by different manufacturers.

1 Scope and field of application

This part of ISO 8036 specifies requirements for immersion oil for general use in light microscopy in the visible spectral range.

NOTE — Visible spectral range is defined as being the range from 400 to 760 nm.

Owing to its optical effect, immersion oil forms part of the optical system of a microscope; this part of ISO 8036 specifies the requirements which shall be met to ensure image quality.

NOTE — This part of ISO 8036 does not cover requirements for suitability for fluorescence microscopy; immersion oil suitable for fluorescence microscopy will be dealt with in ISO 8036/2.

2 Reference

ISO 7944, *Optics and optical instruments — Reference wavelengths*.

3 Requirements

3.1 Optical properties

Immersion oil shall have the following optical properties, measured at a temperature of $23,0 \pm 0,1$ °C and at a pressure of 101 325 Pa¹⁾:

Principal refractive index: $n_e = 1,518 0 \pm 0,000 5$

Abbe number: $v_e = 44 \pm 3$

NOTES

1 Highest optical quality, particularly with large objective aperture, will be obtained at a temperature of use of 23 °C.

2 The principal refractive index, n_e , is the refractive index of light at the green mercury e-line ($\lambda_e = 546,07$ nm; see ISO 7944). This wavelength is close to the maximum sensitivity of the eye and has been used as the principal wavelength of optical computation for some time.

The Abbe number, v_e , is calculated using the following formula:

$$v_e = \frac{n_e - 1}{n_{F'} - n_{C'}}$$

where n_e is the principal refractive index;

$n_{F'}$ is the refractive index of light at the blue cadmium F'-line ($\lambda_{F'} = 479,99$ nm);

$n_{C'}$ is the refractive index of light at the red cadmium C'-line ($\lambda_{C'} = 643,85$ nm);

3.2 Light transmittance

Immersion oil shall have no regions of selective absorption between 400 and 760 nm. The minimum percentage transmittance measured through a 1 cm cell path shall be as given in the table.

Table

Wavelength nm	Transmittance %
400	60
500	95
600	95
760	95

1) 101 325 Pa = 1 atm

3.3 Viscosity

Immersion oil shall range in viscosity from 0,015 to 0,150 m²/s¹⁾ ± 10 %, measured at a temperature of 23 ± 0,1 °C.

3.4 Toxicity

The data sheet on material safety shall be available from the manufacturer.

4 Marking

The packaging and container label of immersion oil conforming to this part of ISO 8036 shall be marked with the indication "conforms to ISO 8036/1". Toxic, harmful or suspect components shall be indicated on the packaging and on the container label.

In addition, the following information shall be included on the container label:

- a) the principal refractive index and tolerances;
- b) the Abbe number and tolerances;
- c) the temperature of calibration;
- d) the refractive index temperature coefficient;
- e) the viscosity, in centistokes, and tolerance;
- f) the date of expiry for unopened containers;
- g) the manufacturer's or supplier's name or mark, and the country of origin;
- h) a statement that the immersion oil complies with the requirements laid down in this part of ISO 8036.

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1) $10^{-4} \text{ m}^2/\text{s} = 1 \text{ cSt}$