
**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



Foreword

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International Standard ISO 8036-1 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*, Subcommittee SC 5, *Microscopes and endoscopes*.

This second edition cancels and replaces the first edition (ISO 8036-1:1986), which has been technically revised.

ISO 8036 consists of the following parts, under the general title *Optics and optical instruments — Microscopes*:

- Part 1: *Immersion oil for general use in light microscopy*
- Part 2: *Immersion oil for use in fluorescence microscopy*

Annex A of this part of ISO 8036 is for information only.

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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 part of ISO 8036 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.

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Optics and optical instruments — Microscopes —

Part 1:

Immersion oil for general use in light microscopy

1 Scope

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

NOTE 1 Visible spectral range is defined as being the wavelength range from 400 nm 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 2 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 Requirements

2.1 Optical properties

Immersion oil shall have the following optical properties, measured at a temperature of 23 °C and at a pressure of 101 325 Pa:

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

— Abbe number: $v_e = 44 \pm 3$

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 ($\lambda_{F'} = 479,99\text{ nm}$);

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

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

NOTE 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.

2.2 Light transmittance

Immersion oil shall have no regions of selective absorption between 400 nm and 760 nm. The minimum percentage transmittance measured through a 10 mm cell path shall be as given in table 1.

Table 1 — Light transmittance

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

2.3 Viscosity

Immersion oil shall range in viscosity from 0,000 15 m²/s to 0,001 5 m²/s $\pm$ 10 %, measured at a temperature of 23°C.

2.4 Toxicity

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

3 Marking

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

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

- the principal refractive index and its tolerance at 23 °C;
- the Abbe number and its tolerance at 23 °C;
- the refractive index temperature coefficient;
- the viscosity, in metres squared per second, and tolerance;
- the date of expiry for unopened containers;
- the manufacturer's or supplier's name or mark, and the country of origin.