
**Optics and photonics — Minimum
requirements for stereomicroscopes —**

**Part 2:
High performance microscopes**

*Optique et photonique — Exigences minimales pour les
stéréomicroscopes —*

Partie 2: Microscopes à hautes performances

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11884-2 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 5, *Microscopes and endoscopes*.

This second edition cancels and replaces the first edition (ISO 11884-2:1997), which has been technically revised.

ISO 11884 consists of the following parts, under the general title *Optics and photonics — Minimum requirements for stereomicroscopes*:

— *Part 1: Stereomicroscopes for general use*

— *Part 2: High performance microscopes*

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Optics and photonics — Minimum requirements for stereomicroscopes —

Part 2: High performance microscopes

1 Scope

This part of ISO 11884 specifies minimum requirements for high performance stereomicroscopes. It is not applicable to operation microscopes.

2 Normative references

The following referenced documents are indispensable for the application 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 7944, *Optics and optical instruments — Reference wavelengths*

ISO 9022-2, *Optics and optical instruments — Environmental test methods — Part 2: Cold, heat and humidity*

ISO 9022-3, *Optics and optical instruments — Environmental test methods — Part 3: Mechanical stress*

ISO 11883, *Optics and optical instruments — Microscopes — Marking of stereomicroscopes*

ISO 10934-1, *Optics and optical instruments — Vocabulary for microscopy — Part 1: Light microscopy*

ISO 15227, *Optics and optical instruments — Microscopes — Testing of stereomicroscopes*

IEC 61010-1:2001, *Safety requirements for electrical equipment for measurement, control and laboratory use — Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10934-1 apply.

4 Requirements

All the indications given below are minimum requirements. They apply to the reference wavelength in accordance with ISO 7944.

4.1 Optical and mechanical specifications

The specifications given in Table 1 shall apply.

Testing shall be done in accordance with 5.1.

Table 1 — Requirements for optical and mechanical specifications

| Criterion | | | Requirements |
|---|--|----------------------------------|--------------------------------------|
| Tolerance of total magnification | | | ± 7,5 % |
| Difference in magnification between left and right optical systems | | | ≤ 1,5 % |
| Difference in axis between left and right optical systems ^a | vertical | | ≤ 15' |
| | horizontal ^b | convergence | ≤ 45' |
| | | divergence | ≤ 10' |
| Horizontal difference in the centre of the primary image between left and right optical systems ^c | | | ≤ 0,33 mm |
| Difference in centres of eyepiece diaphragm between left and right optical systems | vertical | | ≤ 0,2 mm ^d |
| | horizontal ^e | divergence | ≤ 0,4 mm ^d |
| | | convergence | ≤ 0,4 mm ^d |
| Shift of focussing planes | | axial object plane | $S_o \leq 3 \times D_F^{fg}$ |
| by magnification change | | lateral image plane ^h | ≤ 0,4 mm diameter |
| Focus difference between both optical systems | | | $D_{L/R} < 1,5 \times D_F^f$ |
| The resolution in the centre of the field shall be a minimum of | | | 2 500 × NA line pairs/mm |
| Difference in imaging rotation between right and left image | | | ≤ 2° |
| Eyepiece | Difference in exit pupil height between left and right optical systems | | ≤ 1,5 mm at 0 D on the dioptre scale |
| | Calibration error if a dioptre scale is used | | ± 0,25 D at 0 D on the dioptre scale |
| | Minimum range for interpupillary distance | | 55 mm to 75 mm |
| | Minimum adjustment range | | + 5 D to - 5 D |
| <p>^a Including a 10× eyepiece and 0 D adjustment.</p> <p>^b This requirement does not apply to those stereomicroscopes where the mechanical axes of the eyepieces are not parallel to each other due to the design.</p> <p>^c This requirement is only valid if the horizontal difference in axis does not apply.</p> <p>^d To be measured on the image plane of the stereomicroscope to be tested.</p> <p>^e This requirement applies to those stereomicroscopes where the mechanical axes of the eyepieces are not parallel due to the design.</p> <p>^f Depth of field, in millimetres (in object space)</p> $D_F = \frac{\lambda}{2NA^2} + \frac{1}{7 \times M_{TOT\ VIS} \times NA}$ <p>where:</p> <p>λ is the wavelength, in millimetres;</p> <p>NA is the numerical aperture;</p> <p>$M_{TOT\ VIS}$ is the total visual magnification.</p> <p>^g S_o is the shift of object plane.</p> <p>^h The displacement of a centred structure shall be inside a centred circle of 0,4 mm diameter in the primary image plane.</p> | | | |