INTERNATIONAL STANDARD

ISO 9345-1

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Optics and optical instruments — Microscopes — Imaging distances related to mechanical reference planes —

Part 1:
Tube length 160 mm

Optique et instruments d'optique — Microscopes — Tirages mécaniques en fonction des plans mécaniques de référence —

Partie 1: Tube de 160 mm de longueur

Reference number
ISO 9345-1:1996(E)

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.

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.

International Standard ISO 9345-1 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*, Subcommittee SC 5, *Microscopes*.

ISO 9345 consists of the following part, under the general title *Optics and optical instruments — Microscopes — Imaging distances related to mechanical reference planes*:

— *Part 1: Tube length 160 mm*

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Optics and optical instruments — Microscopes — Imaging distances related to mechanical reference planes

Part 1:
Tube length 160 mm

1 Scope

This part of ISO 9345 specifies the imaging distances of objectives and eyepieces of microscopes with 160 mm mechanical tube length or equivalent.

NOTE 1 A specific combination of eyepiece and objective is frequently used to correct aberrations. Therefore, the combination of an objective from one manufacturer and an eyepiece from another manufacturer, although conforming to this International Standard, may cause loss of image quality.

2 Definitions

For the purposes of this part of ISO 9345, the following definitions apply.

2.1 parfocalizing distance of the objective, l_1: Distance between the locating flange of the objective and the object plane with an uncovered object (see table1, note 2, and figures 1 and 2).

2.2 image distance of the objective, l_2: Distance between the primary image plane and the locating flange of the objective (see figure 1).

2.3 parfocalizing distance of the eyepiece, l_3: Distance between the locating flange of the eyepiece and the primary image plane (see figure 1).

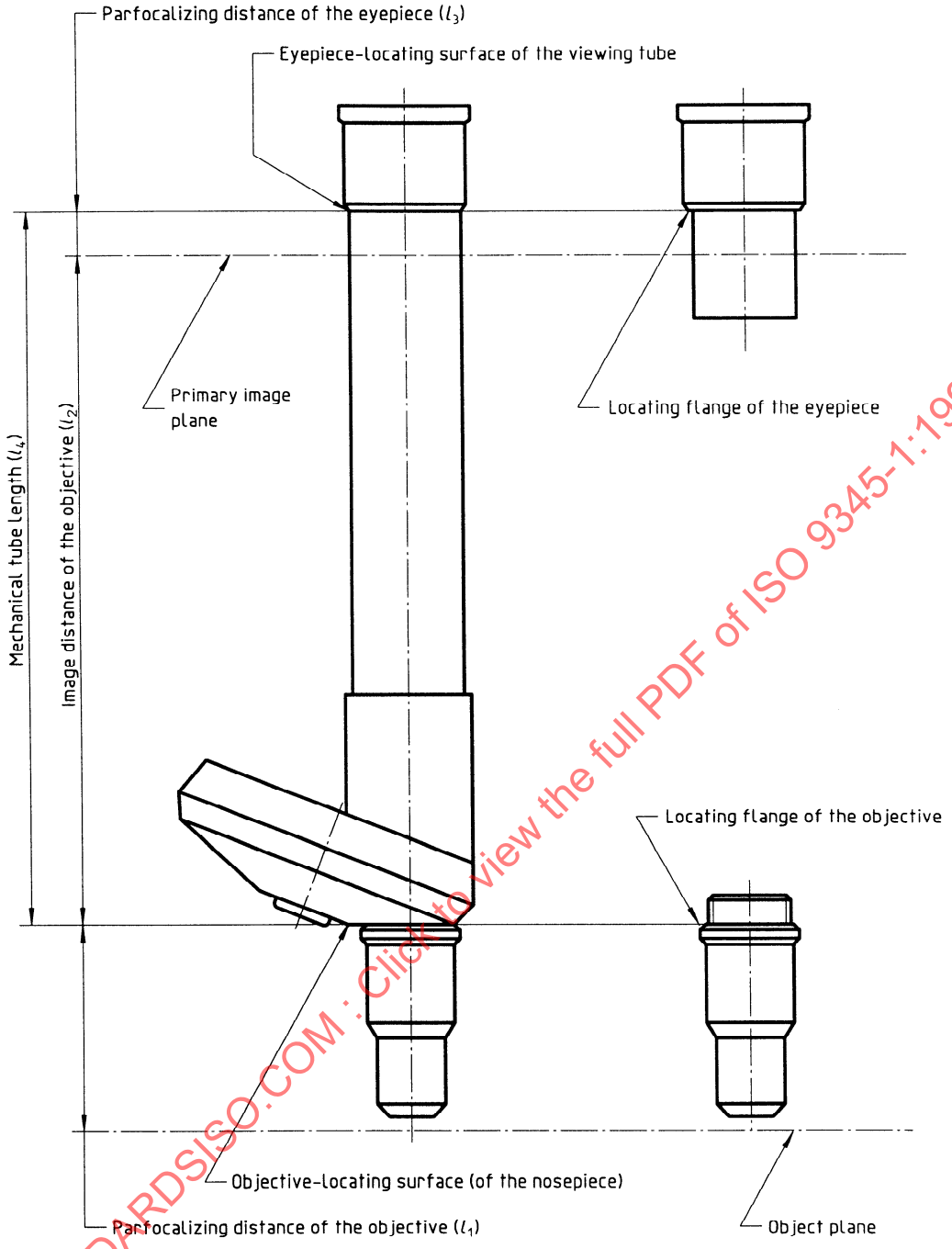
2.4 mechanical tube length, l_4: Distance between the objective-locating surface of the nosepiece and the eyepiece-locating surface of the viewing tube (see figure 1 and note to figure 1).

3 Nominal dimensions

The nominal dimensions shall be as given in table 1 and illustrated in figure 1.

4 Marking

If the magnification of the primary image is changed by built-in optical systems, the tube factor shall be marked, for example × 1,25.



NOTE — Many microscopes have built-in prisms and lenses to change the position and/or the magnification of the image. In this case, the microscope shall have a construction such that, in combination with objectives conforming to this part of ISO 9345, the primary image is produced 10 mm below the eyepiece-locating surface of the viewing tube.

Figure 1 — Locating surfaces, reference planes and imaging distances

Table 1

Distance		Nominal value, mm	Numerical aperture	Tolerance, mm
Parfocalizing distance of the objective	l_1	45,00	⩽ 0,1	± 0,2
			> 0,1 to ⩽ 0,25	± 0,06
			> 0,25 to ⩽ 0,45	± 0,03
			> 0,45	± 0,01
Image distance of the objective	l_2	150,00		± 0,5
Parfocalizing distance of the eyepiece	l_3	10,00		± 0,3
Mechanical tube length	l_4	160,00		± 0,5

NOTES

1 The tolerance ± 0,2 for the parfocalizing distance of objectives with numerical aperture ⩽ 0,1 does not necessarily apply to an objective with magnification lower than × 4.

2 The parfocalizing distance of 45 mm given in table 1 and shown in figure 1 is intended to apply to objectives when used with uncovered objects (specimens). Objectives for use with objects covered by a coverglass shall have a parfocalizing distance as follows, to allow for the virtual displacement of the object by the coverglass:

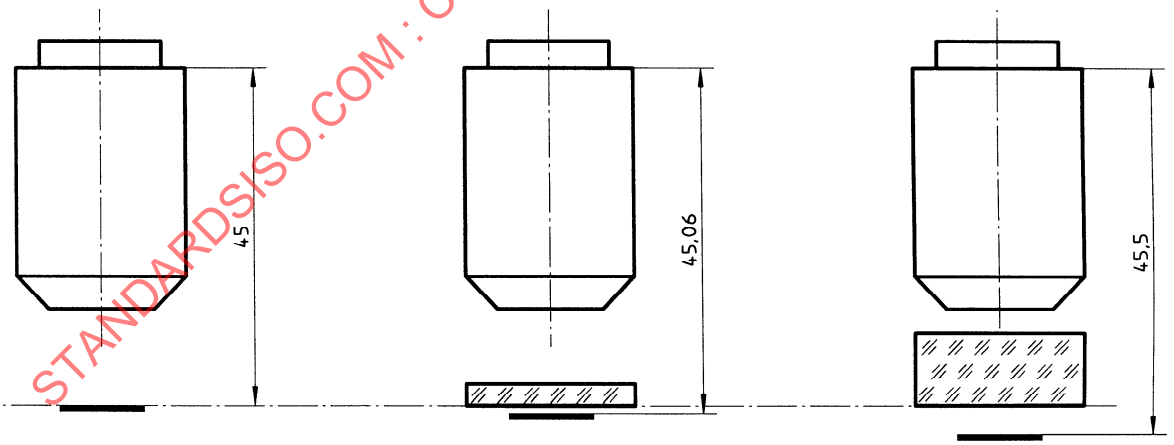
$$45\ \text{mm} + t\left(\frac{n-1}{n}\right)$$

where

t is the thickness of coverglass;

n is the refractive index of the glass.

Dimensions in millimetres



Uncovered object

Object with coverglass of thickness 0,17 mm
n = 1,5

Object with culture chamber of thickness 1,5 mm
n = 1,5

Figure 2 — Examples

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