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Optics and optical instruments — Microscopes — Marking of objectives and eyepieces

*Optique et instruments d'optique — Microscopes — Marquage des objectifs
et des oculaires*



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International Standard ISO 8578 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*, Subcommittee SC 5, *Microscopes and endoscopes*.

Annex A forms an integral part of this International Standard.

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International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet central@iso.ch
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Introduction

This International Standard has been prepared in order to define clearly the data relating to optical characteristics with which microscope objectives and eyepieces have to be marked and the positioning of such marking on the component to enable correct use of the microscope. In addition to data which have to be marked, recommendations for the marking of additional information relating to several other optical characteristics are given.

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Optics and optical instruments — Microscopes — Marking of objectives and eyepieces

1 Scope

This International Standard specifies the format for the marking of data for optical characteristics on microscope objectives and eyepieces and the positioning of this data. It makes recommendations for the marking of additional information, particularly colour coding of rings designating the magnification of objectives and the immersion media with which they are used.

2 Objectives

2.1 Mandatory markings on objectives

The markings on objectives shall be as given in table 1.

2.2 Recommended additional markings on objectives

The marking of additional data is optional. If additional markings are used, they should be as given in table 2.

2.3 Recommendation for arrangement of the marking

It is recommended that the markings in column A of table 3 should be placed above or before the markings of column B, which in turn should be placed above or before those of column C.

3 Eyepieces

3.1 Mandatory markings on eyepieces

The markings on eyepieces shall be as specified in table 4.

3.2 Recommended additional markings on eyepieces

The marking of additional data is optional. If additional markings are used, they should be as given in table 5.

Table 1 — Mandatory markings on objectives

Optical property	Feature to be marked	Example of marking ¹⁾	Remarks
Magnification	Lateral magnification of objectives for a finite image distance	100	Magnification and numerical aperture should be separated by an oblique stroke, e.g. 100/1,30
	Lateral magnification of objectives for an infinite image distance	100×	The marked value of the magnification of infinity-corrected objectives is valid only in combination with the related tube lens. The marking of the symbol “x” has been introduced as an additional designation of magnification on infinity-corrected objectives
Aperture	Numerical aperture	/1,30	The numerical aperture shall be stated to at least 2 decimal places
Immersion medium	Oil for immersion oil	OIL	For additional marking, colour-coded rings can be used (see 2.2)
	W for water	W	
	Glyc for glycerol	GLYC	
	Other		The requirement to use any other immersion medium shall be indicated
Tube length	Length, in mm, for objective of finite primary image distance	160	Tube length and cover glass thickness shall be separated by an oblique stroke, e.g. 160/0,17, 160/–, 160/0, and shall be printed in a smaller size than the data for magnification and aperture
	Symbol ∞ for objective of primary image distance ∞	∞	
Equivalent cover glass thickness	Thickness, in mm	/0	For objectives that are corrected for use with uncovered specimens only, the figure “0” shall be indicated after the oblique stroke
		/0,17	For objectives that are corrected for use only with a cover glass, the value of the cover glass thickness to be used shall be indicated, in millimetres, after the oblique stroke, e.g. 0,17
		/–	For objectives that can be used without a cover glass or with a cover glass up to 0,17 mm thickness, the symbol “–” shall be positioned after the oblique stroke
Phase contrast	Symbol PH	PH 2	A figure after the symbol indicates the associated annular diaphragm
Polarizing microscopy system	Symbol POL	POL	
Flatness of field	Symbol PLAN or PL	PLAN	The symbols “PLAN” or “PL” shall only be used if there is a minimum flat field of 18 mm diameter when the objective is used with a tube factor of 1×

Table 1 (concluded)

Optical property	Feature to be marked	Example of marking ¹⁾	Remarks
State of chromatic correction	Achromat		Achromatic objectives require no marking to indicate the nature of their chromatic correction
	Apochromat, symbol APO	APO	Objectives with a chromatic correction intermediate between achromat and apochromat are generally marked with the manufacturer's designation indicating such correction
Adjustable iris diaphragm	Limiting values of numerical aperture	/1,30–0,8	The lower and upper limits of the numerical aperture range controlled by the iris diaphragm shall be marked at the position where the value for the numerical aperture is usually marked
Manufacturer	Name or symbol of identification		

1) Capital or lower case letters optional.

Table 2 — Recommended additional markings on objectives

Optical property	Feature to be marked		Example of marking ¹⁾	Remarks
Magnification	Value	Colour of ring		
	1/1,25	Black		
	1,6/2	Grey		
	2,5/3,2	Brown		
	4/5	Red		
	6,3/8	Orange		
	10/12,5	Yellow		
	16/20	Light green		
	25/32	Dark green		
	40/50	Light blue		
	63/80	Dark blue		
	100 125 160	White		
Immersion medium	Medium	Colour of ring		To avoid confusion, it is recommended that a coloured ring indicating the immersion medium should only be used in conjunction with a second ring indicating the magnification
	Air	None		
	Oil	Black		
	Water	White		
	Glyc	Orange		
	Others	Red		
Phase contrast	The entire marking, apart from the coloured rings and the manufacturer's name, shall be in green			The marking of the manufacturer's name may be in any colour
Polarizing microscopy systems	The entire marking, apart from the coloured rings and the manufacturer's name, shall be in red			The marking of the manufacturer's name may be in any colour
Differential interference contrast	Symbol DIC		DIC	
Objectives for Epi illumination	Symbol EPI		EPI	

Table 2 (concluded)

Optical property	Feature to be marked	Example of marking ¹⁾	Remarks
Objectives for Epi illumination, brightfield and darkfield	Symbol D	D	The symbol EPI may be marked in addition
Long working distance	Symbol L	L	
Country of manufacture			The marking of the country of origin is mandatory in several countries
1) Capital or lower case letters optional.			

Table 3 — Recommendation of arrangement of markings on objectives

A ¹⁾	B ¹⁾	C ¹⁾
Flatness of field State of chromatic correction Long working distance	Magnification Numerical aperture	Immersion medium Phase contrast Polarizing microscopy system Differential interference contrast Objectives for brightfield and darkfield Epi illumination
1) A to precede B, to precede C.		
NOTES 1 If an additional coloured ring is used in accordance with table 2 to identify the immersion medium, this ring should be placed closer to the front lens than the coloured ring used to indicate the magnification. 2 The marking relating to tube length and cover thickness, specified in table 1, can be in the position of the markings given in either column A or column C.		

Table 4 — Mandatory markings on eyepieces

Optical property	Feature to be marked	Example of marking	Remarks
Magnification	Visual magnification	10×	Visual magnification and field-of-view number shall be separated by an oblique stroke, e.g. 10×/18
Field of view	Diameter, in mm	/18	
Manufacturer	Name or symbol of identification		