
**Microscopes — Microscopes
with digital imaging displays —
Information provided to the user
regarding imaging performance**

*Microscopes — Microscopes avec écrans d'affichage numérique —
Informations fournies à l'utilisateur concernant la performance
d'affichage*





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Foreword

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The committee responsible for this document is ISO/TC 172, *Optics and photonics*, Subcommittee SC 5, *Microscopes and endoscopes*.

Microscopes — Microscopes with digital imaging displays — Information provided to the user regarding imaging performance

1 Scope

This International Standard specifies the minimum information to be provided to the user by the manufacturers of microscopes with digital displays regarding imaging performance.

It further specifies terms and definitions for describing the optical performance of the digital imaging path of microscopy systems including the observation of the image on digital displays.

NOTE Terms and definitions for the direct visual observation with eyepieces are specified in ISO 8039 and ISO 10934-1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 10934-2, *Optics and optical instruments — Vocabulary for microscopy — Part 2: Advanced techniques in light microscopy*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10934-1, ISO 10934-2 and the following apply.

NOTE Terms shown in italics within a definition or a note are defined elsewhere within this International Standard or in ISO 10934.

3.1

digital microscopy system

instrument consisting of an *objective*, an *image sensor* (3.2) and a *digital display* (3.3) to make visible minute details that are not seen with unaided eye

Note 1 to entry: The system might include means for image enhancement, image analysis, archiving, etc.

3.2

image sensor

device to transform an optical image into a *digital image*

3.3

digital display

output device for the visual presentation of a *digital image* and other information

3.4

resolving power limit

maximum spatial frequency distinguishable in object space, expressed in lp/mm

Note 1 to entry: The resolving power actually achieved will always be lower than the resolving power limit due to reduced contrast, moiré patterns, etc. In addition, it depends on sensor type, object structure, etc.

3.5

pixel pitch

distance between the centres of adjacent pixels (picture elements) in an *image sensor* (3.2) or a *digital display* (3.3)

3.6

line pair

one line and one space between the lines of a spatial grid with equal line thickness and space width between lines

3.7

viewing distance

distance between the *digital display* (3.3) and the observer's eye

4 Symbols and abbreviated terms

c_1	coefficient related to the operation mode of the image sensor
$d_{\text{AX SYS}}$	depth of field for observation of the image presented on the digital display
d_{VIEW}	actual viewing distance
$d_{\text{VIEW USEF}}$	useful range of viewing distance
$h_{\text{LIM DIS}}$	height of the object field limited by the image area in the display
$h_{\text{LIM SEN}}$	height of the object field limited by the sensor
h_{SYS}	height of the object field of the microscopy system
λ	wavelength
M_{DIS}	display lateral magnification
$M_{\text{DIS VIS}}$	visual display magnification
$M_{\text{DIS VIS USEF}}$	useful range of the perceived visual display magnification
$M_{\text{TOT PROJ}}$	lateral magnification at the image projected onto the sensor
$M_{\text{TOT VIS}}$	total visual magnification of the virtual microscope image formed by the eyepiece
NA	numerical aperture
$N_{\text{x DIS}}$	number of image pixels in the display in x -direction
$N_{\text{x SEN}}$	number of active sensor pixels in x -direction
$N_{\text{y DIS}}$	number of image pixels in the display in y -direction
$N_{\text{y SEN}}$	number of active sensor pixels in y -direction
n	refractive index of the object or of the immersion media
pp_{DIS}	pixel pitch of the digital display
pp_{SEN}	pixel pitch of the image sensor
RL_{DIS}	display resolving power limit in object space
RL_{OPT}	optical resolving power limit in object space
RL_{SEN}	sensor resolving power limit in object space
RL_{SYS}	system resolving power limit in object space
$w_{\text{LIM DIS}}$	width of the object field limited by the image area in the display
$w_{\text{LIM SEN}}$	width of the object field limited by the sensor
w_{SYS}	width of the object field of the microscopy system