INTERNATIONAL STANDARD

ISO 7944

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Optics and optical instruments — Reference wavelengths

Optique et instruments d'optique — Longueurs d'onde de référence

Foreword

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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 7944 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*.

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Optics and optical instruments — Reference wavelengths

1 Scope

This International Standard specifies two reference wavelengths to be used for the characterization of optical materials, optical systems and instruments, as well as ophthalmic lenses. It defines the associated principal refractive indices and principal dispersions, as well as the Abbe numbers with regard to these reference wavelengths and principal dispersions.

2 Reference wavelengths, principal dispersions and Abbe numbers

2.1 General

The reference wavelengths are the mercury e-line 546,07 nm (see 2.2) and the helium d-line 587,56 nm (see 2.3).

For non-ophthalmic applications the mercury e-line shall be the reference wavelength.

Other wavelengths which may be used in addition to these reference wavelengths are given in tables 1, 2 and 3.

NOTE For the future, it is envisaged that only one reference wavelength is to be specified, even for ophthalmic use.

2.2 Mercury e-line 546,07 nm

The associated principal refractive index n_e is the refractive index at the green mercury e-line and the associated principal dispersion is $n_{F'} - n_{C'}$,

where

$n_{F'}$ is the refractive index at the blue cadmium F'-line;

$n_{C'}$ is the refractive index at the red cadmium C'-line.

The Abbe number ν_e with regard to this reference wavelength and this principal dispersion is defined as:

$$\nu_e = \frac{n_e - 1}{n_{F'} - n_{C'}}$$

2.3 Helium d-line 587,56 nm

The associated principal refractive index n_d is the refractive index at the yellow helium d-line and the associated principal dispersion is $n_F - n_C$,

where

n_F is the refractive index at the blue hydrogen F-line;

n_C is the refractive index at the red hydrogen C-line.

The Abbe number ν_d with regard to this reference wavelength and this principal dispersion is defined as:

$$\nu_d = \frac{n_d - 1}{n_F - n_C}$$

Table 1 — Reference wavelengths and recommended wavelengths in the visible and ultraviolet spectral ranges

Spectral lines	Ultraviolet mercury i-line	Violet mercury h-line	Blue mercury g-line	Blue cadmium F'-line	Blue hydrogen F-line	Green mercury e-line	Yellow helium d-line	Red cadmium C'-line	Red hydrogen C-line	Red helium r-line
Element	Hg	Hg	Hg	Cd	H	Hg	He	Cd	H	He
Wavelength nm	365,01[1)]	404,66	435,83	479,99	486,13	546,07	587,56	643,85	656,27	706,52
Reference wavelength nm	—	—	—	—	—	546,07	587,56	—	—	—
Principal refractive index	—	—	—	2	2	7 n_e	— n_d	—	—	—

1) This single line of the Hg-triplet should be used.

Table 2 — Recommended wavelengths in the infrared spectral range

Element	Rb	Cs	Hg	Hg	Hg	Hg	Hg	Hg	Hg
Wavelength nm	780,0	852,11[1)]	1 013,98[2)]	1 128,66	1 395,1	1 529,6	1 813,1	1 970,1	2 325,4

1) Caesium s-line
2) Mercury t-line

Table 3 — Recommended laser wavelengths

Active medium	He-Ne	He-Ne	Nd: YAG
Wavelength nm	543,5 632,8	1064,1	

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Descriptors: optics, optical equipment, ophthalmic equipment, optical tests, testing conditions, reference data, wavelengths.

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