

---

---

**Optics and photonics — Vocabulary  
for telescopic systems —**

**Part 2:  
Terms for binoculars, monoculars and  
spotting scopes**

*Optique et photonique — Vocabulaire relatif aux systèmes  
télescopiques —*

*Partie 2: Termes pour jumelles, monoculaires et lunettes*





**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2015, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org

# Contents

Page

<b>Foreword</b> .....	<b>iv</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>Bibliography</b> .....	<b>6</b>

## 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword — Supplementary information](#).

The committee responsible for this document is ISO/TC 172, *Optics and photonics*, Subcommittee SC 4, *Telescopic systems*.

This second edition cancels and replaces the first edition (ISO 14132-2:2002), which has been technically revised with the following changes:

- a) the term “telescopic system” has been introduced replacing the term “telescope” where appropriate;
- b) clearer distinction between “ $b$  — distance between centres of eyepieces”, “ $b'$  — interpupillary distance” and “ $B$  — distance between centres of objectives”, see [3.1.11](#) and [3.1.14](#);
- c) the previous term “wide-angle binocular” is now defined in ISO 14132-1 as “wide angle telescopic system”;
- d) a new term was added: “false pupils” ([3.5](#)).

ISO 14132 consists of the following parts, under the general title *Optics and photonics — Vocabulary for telescopic systems*:

- *Part 1: General terms and alphabetical indexes of terms in ISO 14132*
- *Part 2: Terms for binoculars, monoculars and spotting scopes*
- *Part 3: Terms for telescopic sights*
- *Part 4: Terms for astronomical telescopes*
- *Part 5: Terms for night vision devices*

# Optics and photonics — Vocabulary for telescopic systems —

## Part 2:

## Terms for binoculars, monoculars and spotting scopes

### 1 Scope

This part of ISO 14132 gives terms, definitions and letter symbols used in relation with binoculars, monoculars, and spotting scopes.

The alphabetical index of terms that are common for all published parts of ISO 14132 are published in ISO 14132-1.

### 2 Normative references

There are no normative references in this document.

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1

##### **binoculars**

telescopic observational instrument that contains two telescopic systems and is designed as two interlinked monocular telescopic systems having parallel optical axes

#### 3.1.1

##### **prism binoculars**

binoculars with prism erecting systems

#### 3.1.2

##### **lens binoculars**

binoculars with lens erecting systems

Note 1 to entry: Galilean binoculars are types of all-lens binoculars (no prisms).

#### 3.1.3

##### **variable power binoculars**

binoculars that provide a means of changing magnification

Note 1 to entry: Variable power binoculars may be either zoom binoculars or binoculars with discrete change of magnification.

#### 3.1.4

##### **zoom binoculars**

binoculars that provide a mechanism for a continuous change of magnification

#### 3.1.5

##### **binoculars with centre focusing**

binoculars in which focusing is accomplished by the simultaneous movement of optical components within both telescopic systems

**3.1.6**

**binoculars with individual focusing**

binoculars in which focusing is accomplished by moving optical elements in each telescopic system separately

**3.1.7**

**binoculars with internal focusing**

binoculars in which focusing is accomplished by moving optical elements inside the telescope while the external optical elements are stationary

**3.1.8**

**waterproof binoculars**

binoculars that can withstand submersion in water without loss of function

**3.1.9**

**water resistant binoculars**

binoculars that can withstand exposure to splashes, for example rain, without loss of function

**3.1.10**

**hinge of binoculars**

mechanism for the adjustment of interpupillary distance

**3.1.11**

**interpupillary distance**

$b'$

distance between the centres of exit pupils in binoculars

Note 1 to entry: The design of binoculars usually provides a means for changing the interpupillary distance. There also exist models with a fixed interpupillary distance.

**3.1.12**

**interpupillary scale**

scale on binoculars that serves to set the value of the interpupillary distance

**3.1.13**

**disparity of image rotations**

angular difference between the orientations of the images produced by the two telescopic systems of binoculars

**3.1.14**

**specific plasticity**

$P_1$

ratio of the distance between the centres of objectives to that of eyepieces

Note 1 to entry: Specific plasticity is determined in accordance with the formula:

$$P_1 = \frac{B}{b}$$

where  $B$  is the visual base that represents the distance between the centres of objectives of the instrument;  $b$  is the distance between centres of eyepieces.

Note 2 to entry: Sometimes it is better to consider interpupillary distance  $b'$ , rather than the distance between centres of eyepieces  $b$ .

### 3.1.15 plasticity

$P$

numeric value that characterizes the enhancement of stereoscopic perception of space when using the binocular instrument over that of the unaided eye

Note 1 to entry: The plasticity is assessed in accordance with the formula:

$$P = \Gamma \cdot P_1$$

where  $\Gamma$  is the magnification of the instrument;  $P_1$  is the specific plasticity.

### 3.1.16 range of stereoscopic vision

$R_0$

limiting distance at which an observer ceases to perceive objects stereoscopically

Note 1 to entry: The range of stereoscopic vision,  $R_0$ , is defined in accordance with the formula:

$$R_0 = \frac{B}{\eta_e} \cdot \Gamma$$

where  $B$  is the visual base that represents the distance between the centres of objectives of the instrument;  $\eta_e$  is the standard threshold of stereoscopic vision of the unaided eye, in radians, ( $\eta_e = 10''$  approximately  $5 \times 10^{-5}$  rad).

### 3.1.17 threshold depth of stereoscopic vision

$\Delta R$

shortest axial distance in depth between objects which can be perceived with stereoscopic vision

Note 1 to entry: The threshold depth of stereoscopic vision is defined by the formula:

$$\Delta R = \frac{R^2}{B} \cdot \frac{\eta_e}{\Gamma}$$

where  $R$  is the distance to the object that defines the depth of stereoscopic vision.

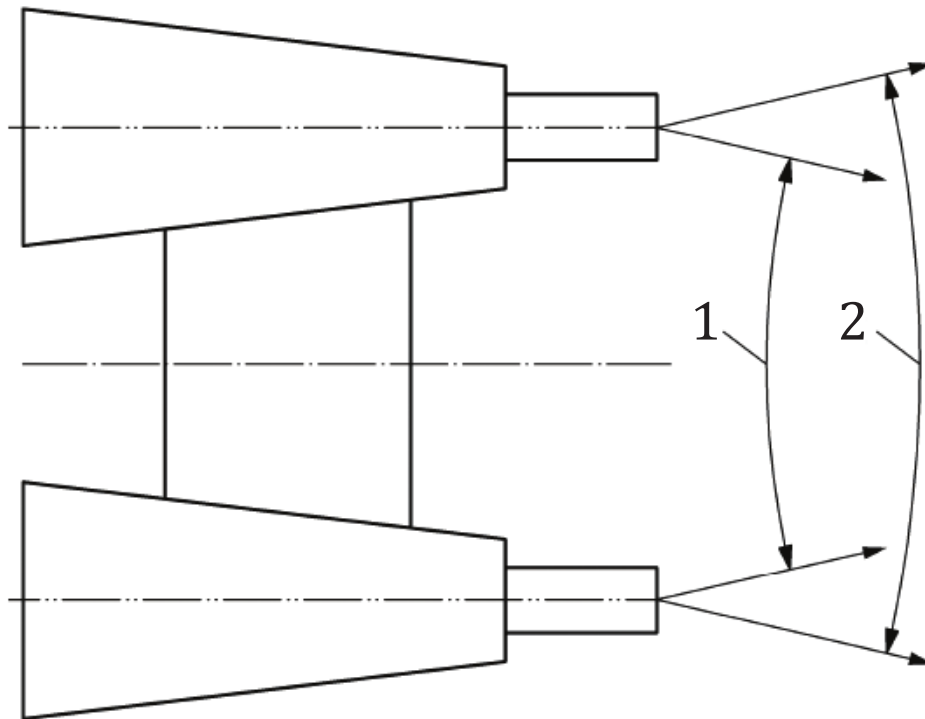
### 3.1.18 binocular alignment

parallelism between the optical axes of two telescopic systems of binoculars

### 3.1.19 convergence of axes

lack of parallelism of axes of bundles emergent from the eyepieces of a binocular instrument, measured in a plane through the centres of the exit pupils and the axial image point at infinity, under the condition that the vertex of the angle formed by the axes of bundles lies behind the exit pupils

Note 1 to entry: See [Figure 1](#).



**Key**

- 1 convergence
- 2 divergence

NOTE In many texts and specifications, the terms “convergence” and “divergence” have a sense opposite to that used here and refer to the direction of sight and not the emergent beam.

**Figure 1 — Illustration of convergence and divergence of axes**

**3.1.20**

**divergence of axes**

lack of parallelism of axes of bundles emergent from the eyepieces of a binocular instrument, measured in a plane through the centres of the exit pupils and the axial image point at infinity, under the condition that the vertex of the angle formed by the axes of bundles lies in front of the objectives

Note 1 to entry: See [Figure 1](#).

**3.1.21**

**dipvergence of axes**

lack of parallelism of axes of bundles emergent from the eyepieces of a binocular instrument, measured in a plane through the axial image point at infinity and perpendicular to the line passing through the centres of the exit pupils

**3.1.22**

**relative difference in magnification**

difference of the magnifications between telescopic systems of binoculars related to the lower of the two magnifications

**3.2**

**monocular**

hand-held single telescopic system with a magnification generally less or equal to 15×



**3.3**

**spotting scope**

tripod- or clamp-mounted single telescopic system with a magnification generally greater than 15×

**3.3.1**

**variable power spotting scope**

spotting scope that provides a means of changing magnification

Note 1 to entry: Variable power spotting scopes may be either zoom spotting scopes or spotting scopes with discrete changes of magnification.

**3.3.2**

**binocular spotting scope**

spotting scope that enables the observation of remote objects with two eyes

**3.4**

**periscopic telescope**

telescopic system designed for observations of remote objects over a shelter or opaque objects

**3.5**

**false pupils**

pupils located in the vicinity of the exit pupil which arise from light which travels along unplanned paths in a prism system

## Bibliography

- [1] ISO 14132-1, *Optics and photonics — Vocabulary for telescopic systems — Part 1: General terms and alphabetical indexes of terms in ISO 14132*



