

JIS

JAPANESE INDUSTRIAL STANDARD

Prism Binoculars

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In the event of any doubt arising,
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Prism Binoculars

B 7121-1985

1. Scope

This Japanese Industrial Standard specifies the binoculars using prism as erecting optical system, hereinafter referred to as the "binoculars".

- Remarks 1. This standard applies also to prism type binoculars using a plane reflecting mirror instead of prism.
2. The units and numerical values given in { } in this standard are in accordance with the International System of Units (SI), and are appended for reference.

2. Definitions

For the purposes of this standard, following definitions apply:

- (1) variable power type binocular The binocular capable of changing the magnification.
- (2) zoom type binocular The binocular capable of changing continuously the magnification without variation of diopter by moving a part of optical system along the optical axis.
- (3) ocular zoom type binocular The zoom type binocular which moves a part of ocular along the optical axis.
- (4) real field of view The range of substance space able to be seen through optical system, to be expressed by the angle (degree, minute).
- (5) apparent field of view The range of substance space able to be seen through optical system, to be expressed by the angle (degree, minute).

Remark: The apparent field of view shall be the product of real field of view multiplied by the magnification.

- (6) magnification The ratio of image size of object (angle) generated by optical system to the size of object viewed by naked eyes (angle).

Remark: It corresponds to the ratio of apparent field of view to real field of view or the ratio of entrance pupil diameter to exit pupil diameter.

- (7) effective diameter of objective lens The diameter of bundle of rays incident in parallel to the optical axis is objective lens in a object space. It corresponds to entrance pupil diameter of optical system.

Remark: In the case where the binocular optical system is ideal, it becomes the inner diameter of lens frame relative to the first plane of objective lens.

- (8) exit pupil diameter The diameter (mm) of image of entrance pupil (exit pupil) by optical system
 Remark: It corresponds to the value (mm) of effective diameter (mm) of objective lens divided by the magnification.
- (9) right and left difference of magnification The difference of magnifications of right and left optical systems to be expressed by percentage.
- (10) dioptr The degree of convergence or divergence of bundle of rays emitted from ocular to be expressed by dioptry (Dptr).
- (11) dioptr scale error The difference of dioptr indicated by dioptr scale marked on the ocular cylinder from the dioptr of bundle of rays emitted from ocular
- (12) dioptr regulation error When the dioptr of optical system is set at 0 Dptr {0 m⁻¹} by using dioptric tester, the reading of dioptr indicated by dioptr scale marked on ocular cylinder.
- (13) right-and-left dioptr difference When dioptrs of right-and-left optical systems are set at 0 Dptr {0 m⁻¹} by using dioptric tester, the difference between the readings of dioptr indicated by dioptr scales marked on right and left ocular cylinders.
- (14) deviation on dioptr of zoom type binocular Runout of dioptr generated when magnification zoom type binocular is changed. It is expressed by dioptry (Dptr).
- (15) reticle parallax The difference between the position of graduation line of reticle and the imagery position of object at infinity by the objective lens, to be expressed by dioptry (Dptr).
- (16) ocular width scale error The difference of the interval between centres of exit pupils of right and left optical systems from the indication value of ocular width scale.
- (17) inversion of image The phenomenon or degree where the vertical direction of image is inclined relative to the vertical direction of object, when viewing the object through the optical system. It is expressed by angle (degree, minute).
- (18) right and left optical axis parallelism The degree that optical axes of right and left optical systems are parallel. It is divided into up-and-down direction and right-and-left direction (inner-and-outer direction) and expressed by angle (minute).
- (19) image displacement by ocular moving Runout of optical axis generated when moving the ocular along the optical axis in optical system, to be expressed by angle (minute).
- (20) resolving power The capacity capable of discriminating simultaneously the longitudinal and lateral marked plate of equal interval white and black streak patterns, when viewing the marked plate through the optical system. It is expressed by

angle (second) of real angle value of visual angle relative to the minimum white and black pair out of streak patterns capable of discriminating simultaneously.

- (21) reflection-reducing treatment Executing the vapor deposition of suitable thick transparent thin film to the transmission surfaces of lens and prism in order to decrease the surface reflection of lens and prism mainly.
- (22) aberration Runout of image generated correspondingly to the object from the real image when the image is formed by the optical system. There are spherical aberration, coma, astigmatism, inflection of image surface, distortion, chromatic aberration, etc.
- (23) right-and-left ocular projection difference When the diopter scales marked on right and left ocular cylinder are set at 0 Dptr {0 m⁻¹}, the difference of heights at the upper surface of right and left butts for eye.
- (24) dioptric tester A small type telescope for reading out the value when moving the objective for measuring the diopter of binocular, in the unit of diopter.
- (25) real angle value The numerical value of space angle before incidence in optical system, and it is used usually for meaning of angle relative to the object from the position of objective lens.

3. Names of Main Parts

Names of main parts of binocular shall be as shown in Fig. 1 a and Fig. 1 b.

Remark: This figure indicates names only, and does not indicate the references for shape and others.

Fig. 1 a. Names of Main Parts

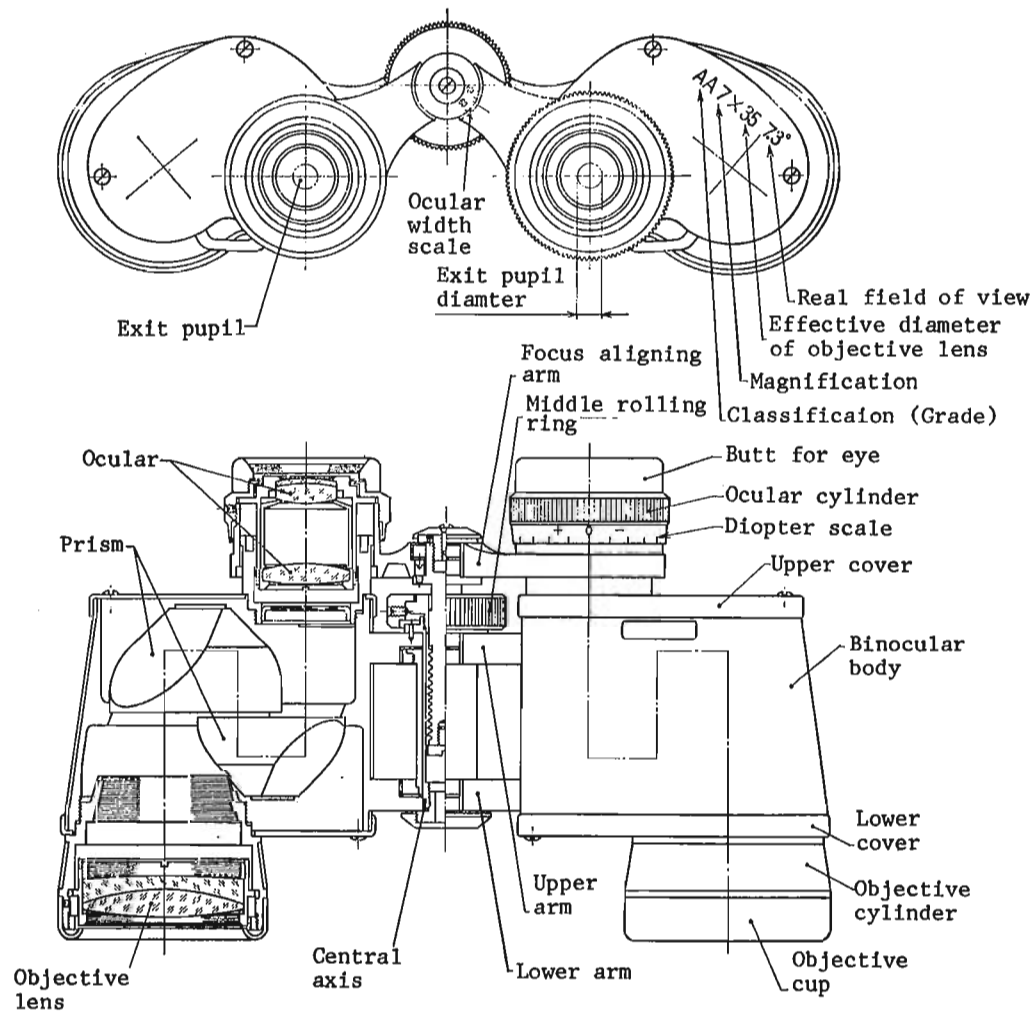
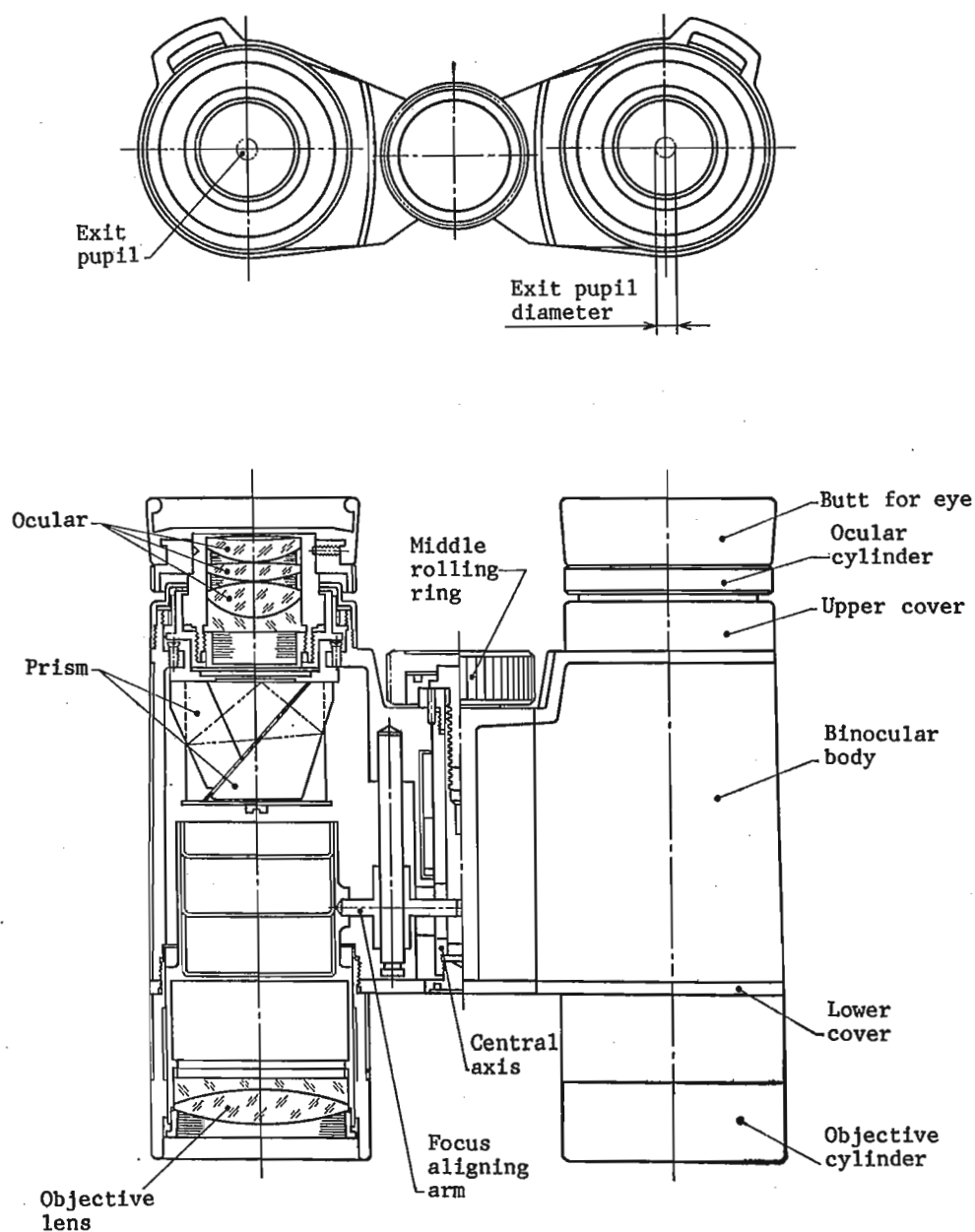


Fig. 1 b. Names of Main Parts



6
B 7121-1985

4. Classification

The classification of binoculars shall be as shown in Table 1.

Table 1. Classification of Binoculars

Classification	Remarks
Grade AA	Binoculars for general observation, those for detail observation or for observing measurement
Grade A	Those for general observation

5. Performance

5.1 Optical Performance

5.1.1 General Optical Performance Tolerances on general optical performances of binoculars shall be in accordance with Table 2.

Table 2. Tolerances on General Optical Performances

Item	Classification	Tolerances	
		Grade AA	Grade A
Magnification		$\pm 5 \%$	$\pm 5 \%$
Effective diameter of objective lens		$\pm 0.5 \text{ mm}$	$\pm 0.7 \text{ mm}$
Exit pupil diameter		$\pm 5 \%$	$\pm 10 \%$
Right-and-left difference of magnification		1 % max.	1.5 % max.
Real field of view		$\pm 5 \%$	$\pm 5 \%$
Diopter scale error		$\pm 0.25 \text{ Dptr}$ per 2 Dptr	$\pm 0.5 \text{ Dptr}$ per 2 Dptr
Diopter regulation error		$\pm 1 \text{ Dptr}$	$\pm 1 \text{ Dptr}$
Right and left diopter difference		1 Dptr max.	1 Dptr max.
Deviation on diopter of zoom type binocular		$\pm 1 \text{ Dptr}$	$\pm 1 \text{ Dptr}$
Reticle parallax		$\pm 0.5 \text{ Dptr}$	$\pm 0.5 \text{ Dptr}$
Ocular width scale error		$\pm 1 \text{ mm}$	$\pm 1 \text{ mm}$
Inversion of image	Same direction	1°30' max.	2° max.
	Difference	40' max.	40' max.