INTERNATIONAL STANDARD

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Optics and optical instruments — Specifications for telescopic sights —

Part 2: High-performance instruments

Optique et instruments d'optique — Spécifications pour lunettes de pointage —

Partie 2: Instruments haute performance

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 14135-2 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 4, *Telescopic systems*.

ISO 14135 consists of the following parts, under the general title *Optics and optical instruments — Specifications for telescopic sights*:

— *Part 1: General-purpose instruments*

— *Part 2: High-performance instruments*

Optics and optical instruments — Specifications for telescopic sights —

Part 2:
High-performance instruments

1 Scope

This part of ISO 14135 applies to high-performance telescopic sights, used on hand-held firearms and airguns. It contains a classification of the usage of telescopic sights and specifies interfaces, minimum requirements and tolerances to their performances.

General-purpose telescopic sights are specified in part 1 of ISO 14135.

2 Normative references

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

ISO 10109-4:2001, *Optics and optical instruments — Environmental requirements — Part 4: Test requirements for telescopic systems*

ISO 14132-1:2002, *Optics and optical instruments — Vocabulary for telescopic systems — Part 1: General terms and alphabetical indexes of terms in ISO 14132*

ISO 14132-3:2002, *Optics and optical instruments — Vocabulary for telescopic systems — Part 3: Terms for telescopic sights*

ISO 14490-1:—[1], *Optics and optical instruments — Test methods for telescopic systems — Part 1: Test methods for basic characteristics*

ISO 14490-3:—[1], *Optics and optical instruments — Test methods for telescopic systems — Part 3: Test methods for telescopic sights*

ISO 14490-5:—[1], *Optics and optical instruments — Test methods for telescopic systems — Part 5: Test methods for transmittance*

ISO 14490-7:—[1], *Optics and optical instruments — Test methods for telescopic systems — Part 7: Test methods for limit of resolution*

1) To be published.

3 Terms and definitions

For the purposes of this part of ISO 14135 the terms and definitions given in ISO 14132-1 and ISO 14132-3 apply.

4 Classification

Due to different requirements, telescopic sights shall be classified according to their end use thus:

— telescopic sights for airguns;

— telescopic sights for pistols (e.g. handgun scopes);

— telescopic sights for rifles (e.g. hunting telescopic sights).

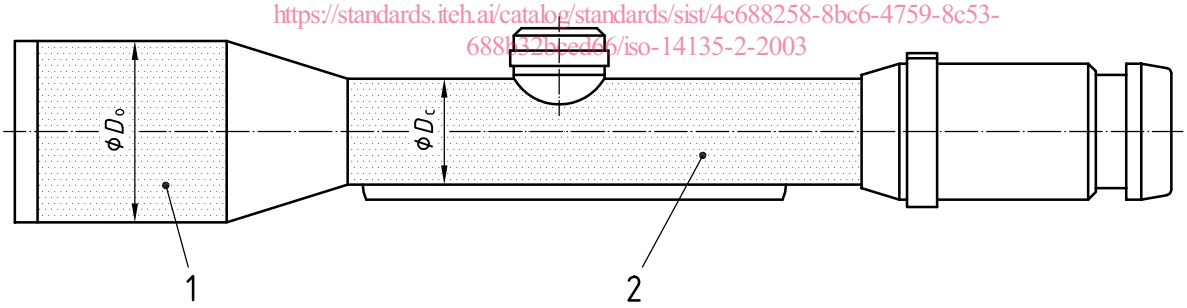
5 Interfaces

Telescopic sights shall have interfaces to mounting systems for interconnection with firearms.

The interface areas shall be the central tube and – if of different size – the objective tube.

The interface areas shall be cylindrical in shape. Alternatively, the central tube may have a dovetail at the bottom side.

Recommended interface dimensions are shown in Annex A.



Key

D_o Diameter of objective tube

D_c Diameter of central tube

1 objective tube

2 central tube

Figure 1 — Interface areas (schematic)

6 Fundamental requirements

Fundamental requirements are defined by minimum values or tolerances for the important characteristics of telescopic sights.

Tolerances specify maximum deviations between measured and nominal values. Nominal values shall be laid down by the manufacturing or trading company.

Telescopic sights shall comply with the environmental requirements relative to the respective instrument type, as appropriate. These environmental requirements are specified in ISO 10109-4.

Compliance of the telescopic sight with the requirements given in Tables 1 and 2 shall be tested according to the test methods specified in ISO 14490-1, ISO 14490-3, ISO 14490-5 and ISO 14490-7.

Table 1 — Minimum values for characteristics of high-performance telescopic sights

Characteristics	Type of telescopic sight	Minimum value/requirement
Eye relief, in millimetres	for airguns	50
	for pistols	250
	for rifles	70
Resolution, in arc seconds (exit pupil $\leqslant$ 4,5 mm)	all	centre $\leqslant 300/D$[a]
Resolution, in arc seconds (exit pupil $>$ 4,5 mm)	for airguns	$\leqslant 2 \times 60/\Gamma$[b]
	for pistols	$\leqslant 1{,}2 \times 60/\Gamma$
	for rifles	$\leqslant 1{,}0 \times 60/\Gamma$
Dioptre adjustment range (total), in dioptres	for pistols or rifles	3
Total reticle adjustment range[c], in arc minutes	for rifles or pistols	30
Transmission	all	Each glass-to-air surface shall be antireflection-coated.

[a] D is the entrance pupil diameter, in millimetres, in accordance with ISO 14132-1.

[b] Γ is the magnification in accordance with ISO 14132-1.

[c] Independent for both elevation and windage adjustment.

Table 2 — Tolerances for characteristics of high-performance telescopic sights

Characteristics	Type of telescopic sight	Maximum deviation		
Magnification	all	$\Gamma \leqslant 3$	$\Gamma > 3$	Zoom
		± 5 %	± 3 %	± 5 %
Field of view	all	± 5 %	± 3 %	± 5 %
Entrance pupil diameter[a]	for airguns	± 5 %		
	for rifles or pistols	± 3 %		
Zero setting of dioptre scale[b], in dioptres	all	$\Gamma \leqslant 2$	$\Gamma > 2$	
		not required	± 0,25	
Parallax of reticle[c], in arc minutes		$\Gamma < 6$	$\Gamma \geqslant 6$	
	for airguns	$4/\Gamma$	—	
	for pistols	$3/\Gamma$	—	
	for rifles	$2/\Gamma$	0,3	
Centre of reticle[d], in relation to total field of view	for airguns	± 1,0 %		
	for rifles or pistols	± 0,7 %		
Reticle tilt, in degrees	all	± 2		
Reticle tracking, in degrees	for rifles or pistols	± 2		
Line of sight shift due to zooming[c], in arc minutes	reticle in 1st image plane	—		
	reticle in 2nd image plane	1		

[a] At maximum magnification on zoom-telescopic sights.

[b] This tolerance includes focus shift due to zooming.

[c] Angular deviation in object space.

[d] In relation to centre of field of view.

7 Consumer information

7.1 Marking

For identification and operation, telescopic sights shall have, as a minimum, the markings listed in Table 3.

Table 3 — Marking

Characteristics	Marking	
	required	recommended
Magnification or range of magnification[a]	×	
Entrance pupil diameter[a]	×	
Name of manufacturer or registered trade mark	×	
Product name or identification		×
Country of origin		×
Serial number		×
Position for zero dioptre		×
Value of reticle adjustment per click		×
Direction of adjustment for point of impact		×

[a] Basic designation is given by the combination of magnification and diameter of entrance pupil, e.g. 6 × 42 or 3 – 10 × 50.

7.2 Information brochures

Product catalogues, user manuals and other technical information brochures for telescopic sights shall provide complete information at least on the technical characteristics given in Table 4.

7.3 Compliance

Products complying with the requirements given in this part of ISO 14135 may be designated as *"High-performance instruments in accordance with this International Standard, i.e. ISO 14135-2"*.

NOTE Products complying with the requirements given in ISO 14135-1 may be designated as *"General-purpose instruments in accordance with ISO 14135-1"*.