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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 45410.1-2025

**Optics and photonics - Test methods for telescopic systems -
Part 1: Basic characteristics**

光学和光子学 望远镜系统试验方法 第1部分：基本特性

(English Translation)

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is part 1 of GB/T 45410 Test methods for optical and photonic telescope systems. GB/T 45410 has been published.

The following parts.

- Part 1: Basic characteristics;
- Part 2: Binoculars;
- Part 3: Aiming the telescope.

This document modifies ISO 14490-1:2005 "Optics and optical instruments - Test methods for telescope systems - Part 1: Basic characteristics" Test Methods.

The technical differences between this document and ISO 14490-1:2005 and their reasons are as follows.

--- Changed the "Scope" content (see Chapter 1) to conform to the usage habits of Chinese standards;

--- The normative reference GB/T 44403 replaces ISO 14132-1 (see Chapter 3, 4.1, 11.1 and 12.1) to comply with my country Standard usage practices;

--- Added normative references to GB/T 45410 (all parts) (see Chapter 13) to comply with the usage habits of Chinese standards;

--- Added index numbers 9 and 10 (see Figures 1 and 3) to meet the usage habits of Chinese standards;

--- Since ISO 14490-1:2005 does not provide a test layout diagram with a virtual exit pupil, the "Figure 6 Specimen with the test arrangement for measuring the image angular field of view with virtual exit pupil is described in detail (see 8.2 and 8.3) to meet the use of our country's standards;

--- Usually, the object angular field of view is measured using the adapter shown in Figure 8, so the "This is different from the angular field of view of the European type of face" has been deleted.

The membrane vertex distance is about 14mm. "(See 9.2) to meet the national conditions of my country;

--- The description of the test apparatus and test procedure (see 11.2 and 11.3) has been changed to meet the use of Chinese standards;

--- Since ISO 14490-1:2005 does not provide a test layout for measuring the minimum observation distance, a test layout diagram is added (see the corresponding test device is re-described (see 12.2) to meet the use of Chinese standards.

The following editorial changes were made to this document.

--- Change the name of the standard to "Optical and photonic telescope system test methods Part 1: Basic characteristics".

Introduction

The telescope system is the core part of various telescopes and is widely used in astronomical observation, space remote sensing, geodesy, weapons and equipment, culture and education, etc.

Sports, culture, entertainment, tourism and other fields. With the advancement of science and technology and the development of social economy, the application scope of telescopes is expanding.

The industry has taken shape as the output of products has gradually increased.

With the rapid development of various telescope system technologies at home and abroad,

the test methods and test report information expression of telescope systems have become more and more the accuracy of the telescope system products is related to the formulation of standards, preparation of technical documents, compilation of teaching materials and books, design, manufacturing and quality evaluation.

The uniformity and correctness of the technical language have a significant impact on the development and unified description of the entire telescope system product.

In view of the above reasons, according to the technical and usage characteristics of the telescope system, the test method and test report information table of the telescope system it is very necessary to standardize and normalize it.

GB/T 45410 "Test methods for optical and photonic telescope systems" is intended to consist of ten parts.

--- Part 1: Basic characteristics. The purpose is to specify the test methods for the technical parameters of telescope systems.

--- Part 2: Binoculars. The purpose is to specify the test methods for the technical parameters of binocular systems.

--- Part 3: Aiming telescope. The purpose is to specify the test methods for the technical parameters of the aiming telescope system.

--- Part 4: Astronomical telescopes. The purpose is to specify the test methods for the technical parameters of astronomical telescope systems.

--- Part 5: Transmittance. The purpose is to specify the test methods for the technical parameters of telescope systems.

--- Part 6: Obscuration glare index. The purpose is to specify the test method for the technical parameters of the telescope system.

--- Part 7: Limiting resolution. The purpose is to specify the test method for the technical parameters of the telescope system.

--- Part 8: Night vision devices. The purpose is to specify the test methods for the technical parameters of night vision device systems.

--- Part 9: Field curvature. The purpose is to specify the test methods for the technical parameters of telescope systems.

--- Part 10: Axial color performance. The purpose is to specify the test method for the technical parameters of telescope systems.

Optics and Photonics Telescope System Experimental Methods Part 1: Basic characteristics

1 Scope

This document describes the telescope system angular magnification, entrance pupil diameter, exit pupil diameter and eye relief, object angular field of view, image angular field of view, Test method for object angular field of view, eyepiece exit light collimation, image deflection and minimum viewing distance for eyeglass wearers.

This document applies to telescopes, binoculars, spotting telescopes and spotting scopes.

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to this document.

GB/T 44403 Optics and photonics - General terminology for telescope systems and binoculars, telescopes, observation mirrors and collimators Telescope Terminology (GB/T 44403-2024, ISO 14132-1:2015, ISO 14132-2:2015, ISO 14132-3:2021, MOD) GB/T 45410 (all parts) Test methods for optics and photonics telescope systems [ISO 14490 (all parts)] MOD);

GB/T 45410.2-2025 Optics and photonics - Test methods for telescope systems - Part 2: Binoculars (ISO 14490-2:2005, MOD);

GB/T 45410.3-2025 Optics and photonics Telescope system test methods Part 3: Collimation telescope (ISO 14490-3:2021, MOD).

3 Terms and definitions

The terms and definitions defined in GB/T 44403 apply to this document.

4.1 General

According to the test results of GB/T 44403, the angular magnification Gamma of the telescope system is calculated according to formula (1).

Gamma =

$\tan w'$

$\tan w \sim$

Where.

w, w' ---are the angles formed by the principal ray of the conjugate beam with the optical