ICS 31.260 SLOVENSKÁ TECHNICKÁ NORMA November 2023

STN	**Optika a fotonika Lasery a laserové zariadenia Meranie fázového posunu optických prvkov na polarizované žiarenie lasera (ISO 24013: 2023)**	**STN EN ISO 24013** 19 2030

Optics and photonics - Lasers and laser-related equipment - Measurement of phase retardation of optical components for polarized laser radiation (ISO 24013:2023)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 10/23

Obsahuje: EN ISO 24013:2023, ISO 24013:2023

Oznámením tejto normy sa ruší
STN EN ISO 24013 (19 2030) z mája 2007

137639

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 24013

July 2023

ICS 31.260

Supersedes EN ISO 24013:2006

English Version

Optics and photonics - Lasers and laser-related equipment - Measurement of phase retardation of optical components for polarized laser radiation (ISO 24013:2023)

Optique et photonique - Lasers et équipements associés aux lasers - Mesurage du retard de phase des composants optiques pour le rayonnement laser polarisé (ISO 24013:2023)

Optik und Photonik - Laser und Laseranlagen - Messung der Phasenverschiebung optischer Komponenten für polarisierte Laserstrahlung (ISO 24013:2023)

This European Standard was approved by CEN on 10 December 2022.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN ISO 24013:2023 E

Contents

Page

European foreword..... 3

European foreword

This document (EN ISO 24013:2023) has been prepared by Technical Committee ISO/TC 172 "Optics and photonics" in collaboration with Technical Committee CEN/TC 123 “Lasers and photonics” the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2024, and conflicting national standards shall be withdrawn at the latest by January 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 24013:2006.

Any feedback and questions on this document should be directed to the users’ national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Endorsement notice

The text of ISO 24013:2023 has been approved by CEN as EN ISO 24013:2023 without any modification.

INTERNATIONAL STANDARD

ISO 24013

Second edition
2023-06

Optics and photonics — Lasers and laser-related equipment — Measurement of phase retardation of optical components for polarized laser radiation

Optique et photonique — Lasers et équipements associés aux lasers — Mesurage du retard de phase des composants optiques pour le rayonnement laser polarisé

Reference number
ISO 24013:2023(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**

Introduction ... **v**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Symbols and abbreviated terms ... **1**

5 Measurement principle ... **2**

6 Preparation of test sample and measuring arrangement ... **3**
6.1 General ... 3
6.2 Laser beam preparation ... 3
6.3 Sample adjustment and system calibration ... 3
6.3.1 Reflective samples ... 3
6.3.2 Possible alignment procedure ... 4
6.3.3 Transmissive samples ... 4
6.4 Detection system ... 4
6.4.1 General ... 4
6.4.2 Polarization analyser ... 4
6.4.3 Power detector ... 4

7 Test procedure ... **5**
7.1 Test procedure for zero or π phase retardation ... 5
7.1.1 General ... 5
7.1.2 Simple test procedure for zero absorptance difference ... 5
7.1.3 Test procedure for non zero absorptance difference ... 5
7.2 Test procedure for π/2 phase retardation ... 5
7.2.1 General ... 5
7.2.2 Simple test procedure for zero absorptance difference ... 5
7.2.3 Test procedure for non zero absorptance difference ... 5

8 Evaluation ... **6**
8.1 General ... 6
8.2 Evaluation for zero phase retardation ... 6
8.2.1 Evaluation for zero absorptance difference ... 6
8.2.2 Evaluation for non-zero absorptance difference ... 6
8.3 Evaluation for π/2 phase retardation ... 6
8.3.1 Evaluation for zero absorptance difference ... 6
8.3.2 Evaluation for non-zero absorptance difference ... 6

9 Test report ... **6**

Annex A (informative) **Theoretical background** ... **8**

Bibliography ... **16**

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).

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).

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 172, *Optics and Photonics*, Subcommittee SC 9, *Laser and electro-optical systems*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 123, *Lasers and photonics*, in accordance with the agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 24013:2006), which has been technically revised.

The main changes are as follows:

— 6.3.3 was amended to add an additional step requiring that a transmitting optic be aligned so that its optical axis is horizontal;

— Clauses 2 and 6.1 were amended to reflect that ISO 14644-1:1999 does not need the year;

— 6.3.1, (π/4 ± 2) mrad was changed to π/4 rad ± 2 mrad;

— 7.1 and 8.1 were updated to account for phase retardances close to π.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Normally it is desirable that the state of polarization be not influenced by the optical components used. For the generation or maintenance of specific states of polarization the influence of optical components on the beam polarization is crucial. For generating circularly polarized radiation from linearly polarized radiation $\pi/2$ phase retarders are used.

This document describes methods to determine the relative phase retardation of optical components with respect to the X- and Y-axes of the polarization and s- and p-polarization, respectively. This document is necessary for optics manufacturers, suppliers and customers of such optics for the determination of the influence of phase retardation of optical components.

INTERNATIONAL STANDARD **ISO 24013:2023(E)**

Optics and photonics — Lasers and laser-related equipment — Measurement of phase retardation of optical components for polarized laser radiation

1 Scope

This document specifies test methods for the determination of the linear optical phase retardation of optical components by polarized laser beams.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 11145, *Optics and photonics — Lasers and laser-related equipment — Vocabulary and symbols*

ISO 12005, *Lasers and laser-related equipment — Test methods for laser beam parameters — Polarization*