INTERNATIONAL STANDARD

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# Lasers and laser-related equipment — Test methods for laser beam parameters — Polarization

*Lasers et équipements associés aux lasers — Méthodes d'essai des paramètres du faisceau laser — Polarisation*

Reference number
ISO 12005:2003(E)

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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 12005 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*, Subcommittee SC 9, *Electro-optical systems*.

This second edition cancels and replaces the first edition (ISO 12005:1999), which has been technically revised.

## Introduction

This International Standard specifies a relatively quick and simple method, requiring minimum equipment, for determining the state of polarization of a laser beam.

This method is for well-polarized laser beams, including those emitted by lasers with a high divergence angle. However, if more completeness in the determination of the polarization status is required, the use of a more sophisticated analysing device is necessary. Although not within the scope of this International Standard, the principle of operation of such devices is given in Annex A, together with a description of the Stokes parameters which are needed in that case.

# Lasers and laser-related equipment — Test methods for laser beam parameters — Polarization



## 1 Scope

This International Standard specifies a method for determining the polarization status and, whenever possible, the degree of polarization of the beam from a continuous wave (cw) laser. It can also be applied to repetitively pulsed lasers, if their electric field vector orientation does not change from pulse to pulse.

This International Standard also specifies the method for determining the direction of the plane of oscillation in the case of linearly polarized (totally or partially) laser beams. It is assumed that the laser radiation is quasi-monochromatic and sufficiently stable for the purpose of the measurement.

The knowledge of the polarization status can be very important for some applications of lasers with a high divergence angle, for instance when the beam of such a laser shall be coupled with polarization dependent devices (e.g. polarization maintaining fibres). This International Standard also specifies a method for the determination of the state of polarization of highly divergent laser beams, as well as for the measurement of beams with large apertures.

## 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 11145:2001, *Optics and optical instruments — Lasers and laser-related equipment — Vocabulary and symbols*

IEC 61040:1990, *Power and energy measuring detectors, instruments and equipment for laser radiation*

CIE 59-1984, *Definitions and Nomenclature, Instrument Polarization*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11145:2001, IEC 61040:1990, CIE 59-1984 and the following apply.

**3.1**
**polarization**
restriction of oscillations of the electric field vector to certain directions

NOTE This is a fundamental phenomenon which can be explained by the concept that electromagnetic radiation is a transverse wave motion, i. e. the vibrations are at right angles to the direction of propagation. It is customary to consider these vibrations as being those of the electric field vector.

**3.2**
**state of polarization**
classification of polarization as linear, random, circular, elliptical or unpolarized