This is a free page sample. Access the full version online.



Irish Standard I.S. EN ISO 11670:2003

Lasers and laser-related equipment - Test methods for laser beam parameters -Beam positional stability (ISO 11670:2003)

© NSAI 2003 No copying without NSAI permission except as permitted by copyright law.

*Incorporating amendments/corrigenda issued since publication:* EN ISO 11670:2003/AC:2004

## The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWIFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

<i>This document replaces:</i> EN ISO 11670:2003 EN ISO 11670:1999	This document is based on: Public   EN ISO 11670:2003 29 Au   EN ISO 11670:1999 11 Fe		<i>Publisl</i> 29 Aug 11 Feb	<i>hed:</i> just, 2003 ruary, 2000		
This document was published under the authority of the NSAI and comes into effect on: 29 August, 2003				ICS number: 31.260		
NSAI 1 Swift Square, T+3 Northwood, Santry F+3 Dublin 9 E st W N	53 1 807 3800 53 1 807 3838 andards@nsai.ie <b>SAI.ie</b>	<b>Sales:</b> T +353 1 85 F +353 1 85 W standard	57 6730 57 6729 ds.ie			
Údarás um Chaighdeáin Náisiúnta na hÉireann						

### EUROPEAN STANDARD

## EN ISO 11670:2003/AC

## NORME EUROPÉENNE

## EUROPÄISCHE NORM

December 2004 Décembre 2004 Dezember 2004

ICS 31.260

English version Version Française Deutsche Fassung

Lasers and laser-related equipment - Test methods for laser beam parameters - Beam positional stability (ISO 11670:2003/Cor.1:2004)

Lasers et équipements associés aux lasers - Méthodes d'essai des paramètres du faisceau laser - Stabilité de visée du faisceau (ISO 11670:2003/Cor.1:2004) Laser und Laseranlagen - Prüfverfahren für Laserstrahlparameter - Strahllagestabilität (ISO 11670:2003/Cor.1:2004)

This corrigendum becomes effective on 8 December 2004 for incorporation in the three official language versions of the EN.

Ce corrigendum prendra effet le 8 décembre 2004 pour incorporation dans les trois versions linguistiques officielles de la EN.

Die Berichtigung tritt am 8.Dezember 2004 zur Einarbeitung in die drei offiziellen Sprachfassungen der EN in Kraft.



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

© 2004 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members. Tous droits d'exploitation sous quelque forme et de quelque manière que ce soit réservés dans le monde entier aux membres nationaux du CEN. Alle Rechte der Verwertung, gleich in welcher Form und in welchem Verfahren, sind weltweit den nationalen Mitgliedern

von CEN vorbehalten.

EN ISO 11670:2003/AC:2004 (E/F/D)

#### **English version**

#### **Endorsement notice**

The text of ISO 11670:2003/Cor.1:2004 has been approved by CEN as a European Corrigendum without any modifications.

#### Version française

#### Notice d'entérinement

Le texte de l'ISO 11670:2003/Cor.1:2004 a été approuvé par le CEN comme Corrigendum européen sans aucune modification.

#### Deutsche Fassung

#### Anerkennungsnotiz

Der Text von ISO 11670:2003/Cor.1:2004 wurde vom CEN als Europäisches Corrigendum ohne irgendeine Abänderung genehmigt.



I.S. EN ISO 11670:2003 INTERNATIONAL STANDARD ISO 11670:2003 TECHNICAL CORRIGENDUM 1

Published 2004-05-15

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

# Lasers and laser-related equipment — Test methods for laser beam parameters — Beam positional stability

**TECHNICAL CORRIGENDUM 1** 

Lasers et équipements associés aux lasers — Méthodes d'essai des paramètres du faisceau laser — Stabilité de visée du faisceau

RECTIFICATIF TECHNIQUE 1

Technical Corrigendum 1 to ISO 11679:2003 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 9, *Electro-optical systems*.

Pages 7, 8, 9

Replace equations (10), (11), (20), (21), (22), (23), (27), (28) and (33) by the following:

© ISO 2004 – All rights reserved

 $\overline{x'}_{i} = \frac{\iint x' E(x', y') dx' dy'}{\iint E(x', y') dx' dy'}$ 

 $\overline{y'}_{i} = \frac{\iint y' E(x', y') dx' dy'}{\iint E(x', y') dx' dy'}$ 

 $s = \sqrt{\frac{\sum_{i} r_i^2}{r_i^2}}$ 

 $\Delta_{x}(z) = 4s_{x}$ 

 $\Delta_v(z) = 4s_v$ 

 $\Delta(z) = 2\sqrt{2}s$ 

 $\zeta_{x'_i} = \frac{\iint x' E(x', y') \mathrm{d}x' \mathrm{d}y'}{\iint E(x', y') \mathrm{d}x' \mathrm{d}y'}$ 

 $\zeta_{y'_i} = \frac{\iint y' E(x', y') dx' dy'}{\iint E(x', y') dx' dy'}$ 

 $s_{\widetilde{y}^2} = \frac{\sum_{i} \left( \zeta_{y_i} - \zeta_{y_M} \right)^2}{n-1}$ 

#### I.S. EN ISO 11670:2003

(10)

(11)

(20)

(21)

(22)

(23)

(27)

(28)

(33)

## EUROPEAN STANDARD

## EN ISO 11670

## NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2003

ICS 31.260

Supersedes EN ISO 11670:1999

**English version** 

### Lasers and laser-related equipment - Test methods for laser beam parameters - Beam positional stability (ISO 11670:2003)

Lasers et équipements associés aux lasers - Méthodes d'essai des paramètres du faisceau laser - Stabilité de visée du faisceau (ISO 11670:2003) Laser und Laseranlagen - Prüfverfahren für Laserstrahlparameter - Strahllagestabilität (ISO 11670:2003)

This European Standard was approved by CEN on 21 February 2003.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

© 2003 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN ISO 11670:2003 E

#### EN ISO 11670:2003 (E)

#### **CORRECTED 2003-06-25**

#### Foreword

This document (EN ISO 11670:2003) has been prepared by Technical Committee ISO/TC 172 "Optics and optical instruments" in collaboration with Technical Committee CEN/TC 123 "Lasers and laser-related equipment", 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 October 2003, and conflicting national standards shall be withdrawn at the latest by October 2003.

This document supersedes EN ISO 11670:1999.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

#### **Endorsement notice**

The text of ISO 11670:2003 has been approved by CEN as EN ISO 11670:2003 without any modifications.

NOTE Normative references to International Standards are listed in Annex ZA (normative).

#### Annex ZA

#### (normative)

## Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE Where an International Publication has been modified by common modifications, indicated by (mod.), the relevant EN/HD applies.

Publication	<u>Year</u>	Title	EN	<u>Year</u>
ISO 11145	2001	Optics and optical instruments - Lasers and laser-related equipment - Vocabulary and symbols	EN ISO 11145	2001
ISO 11146	1999	Lasers and laser related equipment - Test methods for laser beam parameters - Beam widths, divergence angle and beam propagation factor	EN ISO 11146	1999

This page is intentionally left BLANK.



ISO 11670

Second edition 2003-04-01

### Lasers and laser-related equipment — Test methods for laser beam parameters — Beam positional stability

Lasers et équipements associés aux lasers — Méthodes d'essai des paramètres du faisceau laser — Stabilité de visée du faisceau



Reference number ISO 11670:2003(E)

#### ISO 11670:2003(E)

#### I.S. EN ISO 11670:2003

#### PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO 2003

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office Case postale 56 • CH-1211 Geneva 20 Tel. + 41 22 749 01 11 Fax + 41 22 749 09 47 E-mail copyright@iso.org Web www.iso.org

Published in Switzerland

### Contents

#### Page

1	Scope	1
2	Normative references	1
3	Terms and definitions	1
4	Coordinate systems and beam axis	3
4.1	Beam axis distribution	3
4.2	Coordinate systems	3
5	Test principles	5
5.1	Beam positional stability	5
5.2	Beam angular stability	5
6	Measurement arrangement, test equipment and auxiliary devices	5
6.1	Preparation	5
6.2	Control of environment	5
6.3	Detection system	6
6.4	Beam-forming optics, optical attenuators, beam splitters, focusing elements	6
6.5	Calibration	6
7	Test procedures	7
7.1	General	7
7.2	Beam positional stability	7
7.3	Beam angular stability	7
8	Evaluation	7
8.1	Beam positional stability	7
8.2	Beam angular stability	8
9	Test report	10
Ann	ex A (informative) Propagation of absolute beam stability	12
Ann	ex B (informative) Decoupling of short- and long-term fluctuations	15

ISO 11670:2003(E)

### 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.

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 11670 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 11670:1999), Clauses 3 and 9 of which have been technically revised. Annexes A and B have been added.

#### Introduction

The centre of a laser beam is defined as the centroid or first-order spatial moment of the power density distribution. The current propagation axis of a beam is then the straight line connecting two centroids measured at two different planes simultaneously in a uniform, homogeneous medium. Beam axis instability may be characterized by transverse displacements and angular movements that are either monotonic, periodic or stochastic in time.

The movement of a laser beam may be randomly distributed and uniform in amplitude in all directions. In general, the beam may move a greater amount in one direction. If one direction predominates, the procedures specified in this International Standard can be used to identify that dominant direction (the beam x-axis) and its azimuthal location relative to the axes of the laboratory system.

This International Standard provides general principles for the measurement of these quantities. In addition, definitions of terminology and symbols to be used in referring to beam position are provided.

This is a free page sample. Access the full version online.

#### I.S. EN ISO 11670:2003

# Lasers and laser-related equipment — Test methods for laser beam parameters — Beam positional stability

#### 1 Scope

This International Standard specifies methods for determining laser beam positional as well as angular stability. The test methods given in this International Standard are intended to be used for the testing and characterization of lasers.

#### 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

ISO 11146:1999, Lasers and laser-related equipment — Test methods for laser beam parameters — Beam widths, divergence angle and beam propagation factor

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

#### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61040, ISO 11145 and ISO 11146 and the following apply.

## 3.1 angular movement

 $\alpha_x, \alpha_y$ 

angular movement of the laser beam in the x-z and y-z planes, respectively

NOTE These quantities are defined in the beam axis system x,y,z. If the ratio of the quantity in the x direction to that in the y direction does not exceed 1,15:1, the quantity is regarded as rotationally symmetric and only one number may be given. The symbol  $\alpha$  without index is used in that case.

#### 3.2

#### beam angular stability

 $\delta \alpha_x$ ,  $\delta \alpha_y$  twice the standard deviation of the measured angular movement

NOTE These quantities are defined in the beam axis system x, y, z. If the ratio of the quantity in the x direction to that in the y direction does not exceed 1,15:1, the quantity is regarded as rotationally symmetric and only one number may be given. The symbol  $\delta \alpha$  without index is used in that case.

#### 3.3

pivot

point of intersection of all momentary beam axes with the *z*-axis

NOTE The measurement of the pivot is not a subject of this International Standard, because it does not necessarily exist.



This is a free preview. Purchase the entire publication at the link below:

**Product Page** 

S Looking for additional Standards? Visit Intertek Inform Infostore

> Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation