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**Lasers and laser-related equipment —  
Laser device — Minimum requirements  
for documentation**

*Lasers et équipements associés aux lasers — Source laser —  
Exigences minimales pour la documentation*

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Published in Switzerland

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## 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 11252 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 9, *Electro-optical systems*.

This second edition cancels and replaces the first edition (ISO 11252:1993), which has been technically revised.

## Introduction

This document is a type B1 standard as defined in ISO 12100-1.

The provisions of this document may be supplemented or modified by a type C standard.

**NOTE** For machines which are covered by the scope of a type C standard and which have been designed and built according to the provisions of that standard, the provisions of that type C standard take precedence over the provisions of this type B1 standard.

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# Lasers and laser-related equipment — Laser device — Minimum requirements for documentation

## 1 Scope

This International Standard specifies the minimum documentation and information for marking and labelling, to be provided with laser devices (including laser diodes).

The documentation is presented on two levels: as a technical data sheet (Clause 5) and as an instruction manual (Clause 6).

This International Standard does not apply to laser products which incorporate laser devices.

It also does not apply to laser devices manufactured before the date of publication of this document.

Requirements on noise are not included in this standard. These requirements will be included in a subsequent amendment.

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

ISO 11146-1, *Lasers and laser-related equipment — Test methods for laser beam widths, divergence angles and beam propagation ratios — Part 1: Stigmatic and simple astigmatic beams*

ISO 11146-2, *Lasers and laser-related equipment — Test methods for laser beam widths, divergence angles and beam propagation ratios — Part 2: General astigmatic beams*

ISO 11554, *Optics and optical instruments — Lasers and laser-related equipment — Test methods for laser beam power, energy and temporal characteristics*

ISO 11670, *Lasers and laser-related equipment — Test methods for laser beam parameters — Beam positional stability*

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

ISO 12100-1, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

ISO 13694, *Optics and optical instruments — Lasers and laser-related equipment — Test methods for laser beam power (energy) density distribution*

ISO 13695, *Optics and photonics — Lasers and laser-related equipment — Test methods for the spectral characteristics of lasers*

ISO 15367-1, *Lasers and laser-related equipment — Test methods for determination of the shape of a laser beam wavefront — Part 1: Terminology and fundamental aspects*

ISO 15367-2, *Lasers and laser-related equipment — Test methods for determination of the shape of a laser beam wavefront — Part 2: Shack-Hartmann sensors*

ISO 17526, *Optics and optical instruments — Lasers and laser-related equipment — Lifetime of lasers*

IEC 60825-1, *Safety of laser products — Part 1: Equipment classification, requirements and user's guide*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11145 and IEC 60825-1 apply.

### 4 Units

All values shall be stated in SI units.

### 5 Technical data sheet

#### 5.1 General

The documentation to be provided by the manufacturer/supplier shall include the following information:

- intended use of the laser device;
- technical characteristics of the laser device within the fields of use for which the device is delivered;
- type of the laser device;
- lifetime or maintenance information in accordance with ISO 17526;
- data related to the different characteristics and requirements described in this clause.

A model data sheet is shown in Annex A.

#### 5.2 Beam output characteristics

The manufacturer/supplier shall indicate the characteristics listed in Table 1, if applicable, and the method used for the determination.

#### 5.3 Power supply

##### 5.3.1 Electrical power supply

The following items shall be specified, if applicable, and the referenced standards shall be stated:

- voltage and current rating (single or three phases) with frequency and permissible fluctuations;
- maximum power consumption.

If a battery is used, specify the type and characteristics of the battery required to supply power to the laser device and indicate if a battery is provided with the laser device.

### 5.3.2 Non-electrical power source

For a laser needing external power not provided with the laser device (e.g. pumping laser), specify the characteristics for the proper operation of the laser device.

**Table 1 — Information guidelines**

| Characteristics                                                | In accordance with          |
|----------------------------------------------------------------|-----------------------------|
| Beam width and/or diameter                                     | ISO 11146-1 or ISO 11146-2  |
| Beam waist location                                            | ISO 11146-1 or ISO 11146-2  |
| Divergence angle                                               | ISO 11146-1 or ISO 11146-2  |
| Beam propagation ratio                                         | ISO 11146-1 or ISO 11146-2  |
| Beam parameter product                                         | ISO 11146-1 or ISO 11146-2  |
| Beam position stability                                        | ISO 11670                   |
| Spectral characteristics, such as wavelengths or bandwidths    | ISO 13695                   |
| Maximum power (energy) and nominal (guaranteed) power (energy) | ISO 11554                   |
| Power (energy) stability of the beam                           | ISO 11554                   |
| Power (energy) density distribution                            | ISO 13694                   |
| Temporal pulse shape with its characteristics                  | ISO 11554                   |
| State and degree of polarization                               | ISO 12005                   |
| Shape of a laser beam wavefront                                | ISO 15367-1 and ISO 15367-2 |
| Pulse width range                                              | ISO 11554                   |
| Repetition rate range                                          | ISO 11554                   |

### 5.4 Liquids and gases

Provide information for each type of liquid or gas to be used with the laser device (e.g. active medium, solvent, heating and cooling agents) and specify, if applicable, the following:

- flow rate, pressure and quality required;
- characteristics of the fluid;
- permissible extreme temperatures.

The kinds of connectors to be used shall be stated with, in the case of standardized connectors, a reference to the appropriate standards.

### 5.5 Environmental conditions

Specify the environmental conditions which the laser device will tolerate.

NOTE Environmental conditions may include:

- ambient air pressure, temperature and relative humidity range;
- shock and vibration;
- electromagnetic compatibility (immunity, susceptibility and operating environment);
- air cleanliness;
- degree of protection provided by the enclosure (in accordance with IEC 60529).

## 5.6 Mechanical interfaces

The manufacturer/supplier shall indicate the following characteristics with the corresponding tolerances:

- dimensions and mass;
- location and orientation of the beam relative to a reference surface;
- location, characteristics and interfaces of the attachments (state if they are provided or not).

## 5.7 Safety

The manufacturer/supplier shall specify to which safety standard or document the laser device complies.

The manufacturer/supplier shall inform the user of laser radiation hazards and the potential of secondary radiation hazards.

For safety concerning the laser radiation and electrical hazards, the appropriate class in accordance with IEC 60825-1 shall be stated and affixed in a legible fashion.

For the chemical agents and any toxic substance used in the laser device, the information shall comply with the existing standards; moreover, it shall be stated and affixed in legible fashion.

The manufacturer/supplier shall inform the user of explosion and fire hazards, and air contaminants.

## 6 Instruction manual

In addition to the technical data specified in Clause 5, comprehensible information to be supplied with the device shall contain the following:

- transportation, storage, installation and connecting instructions (power supply, gas and fluid connections). Give appropriate diagrams if required;
- operating instructions (for hardware and software);
- safety instructions;
- proposal and indication for waste disposal;
- information for maintaining the laser device, liquids and gases, with all pertinent drawings and diagrams.

## 7 Marking and labelling

Marking and labelling affixed to the device as required by IEC 60825-1 and other applicable standards shall be reproduced in the documentation.

## Annex A (informative)

### Model of data sheet

#### A.1 General information

|                                                                                                              |                                           |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Model type                                                                                                   | .....                                     |
| Manufacturer (or supplier)                                                                                   | .....                                     |
| Intended field(s) of use                                                                                     | .....<br>.....<br>.....<br>.....          |
| Technical characteristics of<br>the laser device in the fields of<br>use for which the device is<br>supplied | .....<br>.....<br>.....<br>.....<br>..... |
| Type of laser device                                                                                         | .....                                     |
| Life time or maintenance<br>information                                                                      | .....                                     |

## A.2 Beam output characteristics

5.2 makes recommendations for the completion of the table as shown below.

| Characteristics                                           | Applicable                                                  | Information/result |
|-----------------------------------------------------------|-------------------------------------------------------------|--------------------|
| beam widths and/or diameter                               | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| beam waist location                                       | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| divergence angle                                          | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| beam propagation ratio                                    | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| beam parameter product                                    | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| beam position stability                                   | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| spectral characteristics, such as wavelength or bandwidth | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| maximum power (energy)                                    | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| nominal guaranteed power (energy)                         | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| power (energy) stability of the beam                      | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| power (energy) density distribution                       | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| temporal pulse shape                                      | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| state and degree of polarization                          | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| shape of a laser beam wavefront                           | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| pulse width range                                         | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |
| repetition rate range                                     | <input type="checkbox"/> yes<br><input type="checkbox"/> no |                    |